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Marketing Research Report No. 8 2 1

WHOLESALE FOOD DISTRIBUTION FACILITIES FOR HONOLULU, HAWAII

Agricultural Research Service
United States Department of Agriculture
In Cooperation With
The Department of Land and Natural Resources,
State of Hawaii, and
The Agricultural Extension Service of the University of Hawaii

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WHOLESALE FOOD DISTRIBUTION FACILITIES FOR HONOLULU, HAWAII

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SUMMARY

Most of the food imported into Hawaii must pass through unsuitable, outdated, and inefficient marketing facilities in Honolulu, the State's major metropolitan area.

This report was designed to assist State and local authorities and the wholesale food industry in planning new wholesale food facilities in Hawaii to replace the present facilities. The report presents guides for constructing an efficient, modern wholesale food center.

In 1964, 130 independent wholesalers of fresh fruits and vegetables, groceries, meat and related products, and dairy products and eggs received about 230,500 tons of these commodities. These firms distributed 72 percent of this total within Honolulu, 21 percent to other parts of Oahu, 5 percent to neighboring islands, and 2 percent to the mainland United States.

In a study of the 130 independent wholesalers, it was determined that 71 of them would benefit by moving to new facilities in the food center. Their major problems were inadequate facilities, lack of a concentrated market, and unnecessary duplication of functions. These and other problems have led to unduly high costs of operation. Selected handling costs incurred by the 71 wholesalers were estimated to be $3.1 million during 1964. These costs could be reduced by an estimated $591,000 to $654,000 a year, depending on whether the food center was privately or publicly financed.

Other firms either occupy facilities that meet their needs or would be unable to move because of lease commitments or other reasons.

Plans developed for new facilities provide for four multiple-occupancy buildings and one single-occupancy building. Two multiple-occupancy buildings would be for fresh fruit and vegetable wholesalers, one for meat, dairy products, and egg wholesalers, and one for grocery wholesalers. The single-occupancy building would be for a large-volume grocery firm.

The new facilities, including 48,000 square feet in the single-occupancy building, would provide 265,170 square feet of space. At least 24 acres of land would be required for these facilities. Paved streets at least 150 feet wide are recommended where buildings face each other and 200 feet wide where center of the street parking is provided. Parking space for vehicles, in addition to the loading and unloading space at the platforms of buildings, is provided. The master plan for the food center includes an area for allied industry and space to permit expansion of wholesale food facilities.

Total construction and associated costs are estimated to be about $3,665,000.

Five possible sites were considered before the Fort Armstrong site was selected. Because land is relatively valuable, land rental is more common than land ownership in Hawaii. Considering the use proposed, a reasonable value for Fort Armstrong land is $5 per square foot.

Under private financing, rent for the new facilities would be about $320,000 more than for facilities presently occupied by the wholesalers. The cost of amortization and other operating costs that affect rents could be reduced by public financing.

Consumers would have better quality merchandise. In addition, the local governments could more easily enforce fire, health, and sanitary regulations.

INTRODUCTION

The wholesale food industry in Hawaii has long recognized the need for more modern facilities and improved handling practices in the State. Facilities that were designed for the needs of Hawaii as a territory cannot be considered adequate to serve the projected growth in population and increase of tourism.

In 1961, the First Legislature of the State of Hawaii in Senate Concurrent Resolution No. 62 asked that--

> the Department of Economic Development Board of Harbor Commissioners, Department of Transportation and the Department of Land and Natural Resources study the need and feasibility of establishing a food wholesale market center in Honolulu and whether State land should be made available for this purpose.

To fulfill this request, a representative sampling was made of a cross section of persons operating wholesale food facilities in Honolulu. Private feasibility studies performed for local groups and publications of the U.S. Department of Agriculture were analyzed. A report[1] issued in February 1962 stated:

> The need for such a facility does exist and it is most urgent that actions be taken immediately to provide such a complex either with private or State funds, or a combination of monies and talents.

A separate report,[2] compiled by the Hawaii Department of Agriculture for the Governor of Hawaii stated:

> All present indications, with one exception, are favorable for development of a wholesale food center at Fort Armstrong. The exception, which is the problem of moving the present occupants of the proposed area, may cause serious delays in any potential development. Consensus of all departments and most individuals contacted during the study is that a wholesale food market center is highly necessary and desirable and that the Fort Armstrong area is the most logical and economic choice for a location.

In 1964, a detailed study of food wholesaling in Honolulu was undertaken at the request of the State government. This study was under general supervision of the Transportation and Facilities Research Division, Agricultural Research Service, U.S. Department of Agriculture (USDA), in cooperation with the following State agencies: The Department of Land and Natural Resources, the Department of Economic Development, the Department of Agriculture, and the University of Hawaii, College of Tropical Agriculture.

Studies published between 1962 and 1967, either by the State or for the State, have guided the planning of the proposed food center at Fort Armstrong to date. Steps to be taken to insure the successful completion of previous planning efforts are outlined in this study.

The purpose of the study was to determine (1) the adequacy of wholesale food facilities in Honolulu for present and future needs; (2) the costs of handling food products in existing facilities; (3) whether there is a need for new facilities; (4) how many wholesalers the center should provide for; (5) how much income would be needed to finance such a center; and (6) whether the Fort Armstrong site would be large enough; and (7) to outline the benefits that might accrue from improved facilities.

Data in this report are for the year 1964, unless otherwise noted. Data were obtained by interviews with food wholesalers, representatives of the State of Hawaii and the city of Honolulu, and industry or civic groups. Limited investigations were conducted of handling and distribution facilities in other counties, but primarily for information rather than analysis.

Population

Honolulu County is the major wholesale food distribution point in Hawaii and is the largest of the five counties in the State. In 1960, Hawaii had a total population of 632,772. The following tabulation shows the population by counties:

County	Population	Percentage of total
Honolulu	500,409	79.0
Hawaii	61,332	9.6
Maui	42,576	6.7
Kauai	28,176	4.4
Kalawao	279	.3
Total	632,772	100.0

Between 1950 and 1960 the population of the State increased 26.6 percent.

Economic Change

The economy of Hawaii is expanding, largely because of integration in the U.S. market. Three major sources of income in Hawaii are sugar, pineapples, and tourism.

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[1] Jefferson, H. D., Jr. Needed: Wholesale Food Center for Hawaii. Dept. Econ. Devlpmt., State of Hawaii. 33 pp., illus. 1962.

[2] Hawaii Department of Agriculture. Report on Wholesale Food Market Center at Fort Armstrong. 28 pp., illus. 1962.

Hawaii grows one-seventh of all the sugar used in the United States and 75 percent of all the pineapples marketed in the world.

The State is predominantly agricultural, although cultivatable land is only about 7 percent of the total land area; 40 percent is suitable for grazing; and another 25 percent is in forest reserves. Three-fourths of the agricultural land is planted in sugarcane. Figure 1 shows the principal islands in the State and the county delineations.

Tourism is a growing industry, which may compete with agriculture as a major source of income. If visitors are to be attracted to Hawaii, a dependable supply of quality food products must be available.

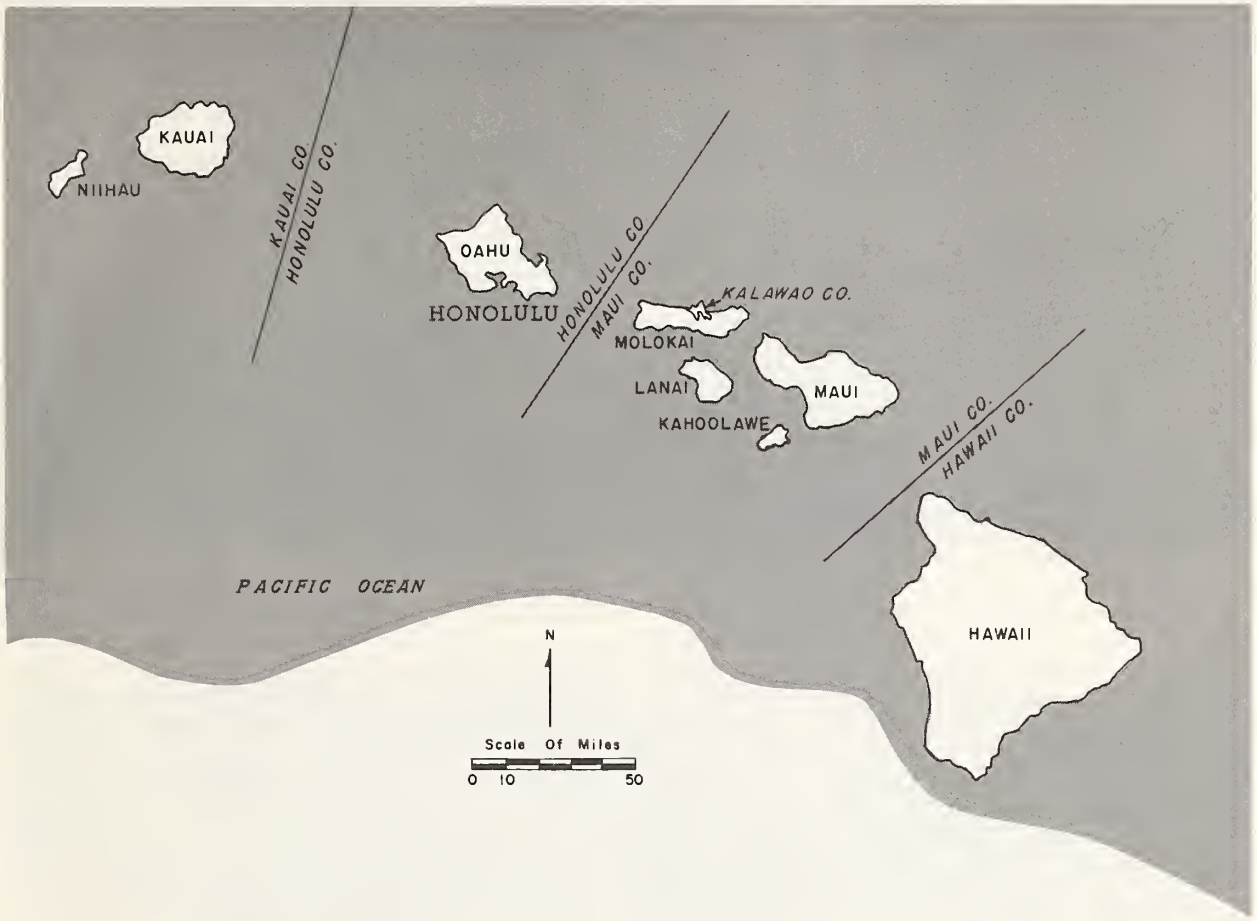

FIGURE 1.--Principal islands in the State of Hawaii and the county delineations.

FOOD MARKETING IN HONOLULU

Over 68 percent of the food consumed in Hawaii must be imported. A large percentage of these imports move through the port facilities in Honolulu. Honolulu has the most extensive sea and air facilities in the State. Honolulu harbor is well protected and capable of handling a wide range of ships. There has been a marked expansion in docks and other harbor facilities during the past 10 years.

Honolulu is a "pocket" market in the extreme sense of the term. That is, once food products reach the State they must be disposed of there. Because the buyer cannot make his purchases elsewhere, the seller has often had an indifferent attitude; he knows the buyer will eventually come to his terms, even if the product is not of the best quality.

There have been dynamic changes in transport techniques in moving food products to Hawaii, but the food industry in Hawaii has not kept abreast of new developments in facility design and handling methods.

One of the most recent innovations in transportation is containerization--products are loaded in van containers, moved by

truck or rail to ports, and loaded on ships. Containerization permits moving food products in the same sealed container[3] from any point in the United States, across the Pacific, to Hawaii. The cargo, refrigerated or dry, reaches its destination without the need for handling the contents en route.

In 1958, container shipments to Hawaii were initiated. The acceptance of this method of shipping is evidenced by its growth and by the expansion plans of large overseas shipping firms, which are incorporating container handling facilities into their operations. Containerized shipments eliminate unloading and reloading of cargo en route; reduce vessels' time in port, because of quick mechanized handling of large quantities of merchandise; and reduce and nearly eliminate pilferage and breakage by better stowage.

Containerization has brought about tremendous improvements in handling and has reduced spoilage in fresh, chilled, and frozen foods. An even greater benefit is the higher quality of the product when it reaches the consumer.

Containers of food arrive in Honolulu at Diamond Head Terminal (fig. 2). When a container is destined for one consignee, it is classified as a CY lot (container yard lot). The container yard is a waterfront location where containers are held after being discharged from a vessel or assembled for loading onto a vessel (fig. 3).

Straddle trucks move the containers from dockside, stack them two high, or transfer them to or from truck chassis (figs. 4 and 5). An underground electrical system supplies power to refrigerated containers awaiting shipment or delivery.

Cargo moving from a single shipper to multiple consignees may be unloaded from the container and stored for delivery to customers. This type of cargo is handled at the container freight station, which is a covered facility. About one-third of the cargo moving in containers is in less-than-container-load quantities and must be consolidated for loading into containers. The freight station, also referred to as the "break-bulk warehouse," is staffed and equipped to receive merchandise for loading into a container and to deliver merchandise that has been removed from a container.

Honolulu food wholesalers received approximately 291,000 tons of products in 1964 from mainland sources, local producers, and foreign countries. This volume was distributed by 140 independent food wholesalers, 10 of whom were fish and seafood wholesalers, and 12 chainstore operations. Food shipped direct to local processors, retail establishments, or public warehouses for redistribution was not included in the study since it did not move through wholesale food facilities in Honolulu.

Direct receipts of food products in Honolulu in 1964, by type of wholesaler and method of transportation, are shown in table 1. Chainstore operations and seafood wholesalers were included to show the total estimated volume of food handled in Honolulu. The University of Hawaii collected the data for seafood wholesalers for comparative purposes only. The food chain organizations are either housed in relatively new facilities or have long-range plans to relocate; therefore, further analysis of the chainstore and seafood wholesalers will not be made in this report. The report covers only the 130 independent wholesale firms that handled fresh fruits and vegetables, meat and related products, groceries, and dairy products and eggs.

Containerized shipments represented the greater part of direct receipts of the 130 independent wholesalers. Fresh fruit and vegetable wholesalers and grocery firms received more than one-half of their volume in containers. Most of this volume was brought to the wholesalers' facilities in the original container.

General maritime shipments were approximately 12 percent of direct receipts; general barge shipments, about 10 percent; and products received by truck from Oahu producers, almost 18 percent.

[3] "Container" as used in this report refers to large van containers similar to over-the-road tractor trailers used on the mainland.

BN-32073

FIGURE 2.--Diamond Head Terminal: Containers being unloaded by large gantry cranes at pier 2.

FIGURE 3.--Aerial view of pier 2 and container yard.

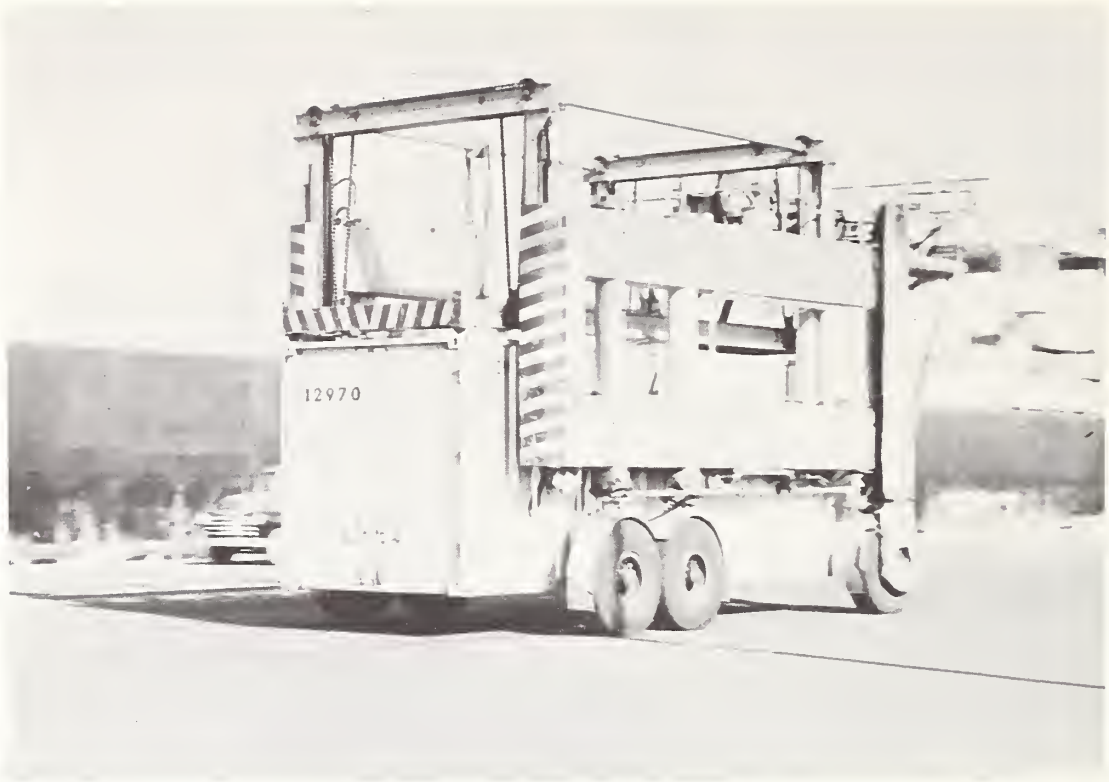

FIGURE 4.--Straddle truck moving container from dockside to container yard. BN-32074

FIGURE 5.--Containers stacked two high awaiting shipment or delivery. An underground electrical system supplies power to refrigerated containers.

TABLE 1.--Estimated volume and percentage of food products received, by type of wholesaler and method of transportation, Honolulu, 1964

Type of wholesaler	Volume						Percentage					
	Container	General maritime	General barge	Air	Trucks from Oahu producers	Total	Container	General maritime	General barge	Air	Trucks from Oahu producers	Total
	Tons	Tons	Tons	Tons	Tons	Tons	Percent	Percent	Percent	Percent	Percent	Percent
Fresh fruits and vegetables.	34,525	1,174	18,136	495	13,953	68,283	50.6	1.7	26.6	0.7	20.4	100.0
Meat and related products...	21,509	10,605	2,469	7	17,679	52,269	41.2	20.3	4.7	(1)	33.8	100.0
Groceries.....	82,231	16,084	577	0	8,337	107,229	76.7	15.0	.5	0	7.8	100.0
Dairy products and eggs.....	508	6	1,291	13	895	2,713	18.7	.2	47.6	.5	33.0	100.0
Total.....	138,773	27,869	22,473	515	40,864	230,494	60.2	12.1	9.8	.2	17.7	100.0
Seafood.....	2,518	3,757	32	0	1,538	7,845	32.1	47.9	.4	0	19.6	100.0
Chainstore.....	37,497	7,895	1,452	10	5,957	52,811	71.0	15.0	2.7	(1)	11.3	100.0
All wholesalers.....	178,788	39,521	23,957	525	48,359	291,150	61.4	13.6	8.2	.2	16.6	100.0

[1] Less than 1/10 of 1 percent.

DESCRIPTION OF PRESENT WHOLESALE MARKET FACILITIES

For descriptive purposes, the Honolulu area is divided into three market classifications: the South Business District, the North Business District, and other Honolulu. The firms not in the first two classifications will be listed as "other Honolulu." Location of the facilities of wholesale food firms is shown in figure 6.

A survey in 1966 of the general structures and facilities housing the wholesale food industry in Honolulu indicated that 70 to 80 percent of the food operators were functioning in obsolete or obsolescent buildings.

The South Business District

The South Business District is bounded on the northwest by Richards Street, on the northeast by South King Street and Kapiolani Boulevard, on the southeast by Piikoi Street, and on the southwest by Ala Moana Boulevard. The area includes the Ala Moana Market center, one of the two wholesale produce markets on the island.

The South Business District contains 51 wholesale food firms: 21 fresh fruit and vegetable wholesalers, 15 grocery firms, 12 meat and related product firms, and three dairy products and egg firms.

The Ala Moana market is on Auahi Street, about half a mile from downtown Honolulu. The produce dealers moved to this area in 1948. At the time of our study, the market contained approximately 7 acres. Its six buildings housed retail outlets, 18 fresh fruit and vegetable wholesalers, one meat and related products dealer, and four grocery wholesalers. All the market buildings were antiquated, shed-type wood structures built by the U.S. Navy for warehouses during World War II. Although the buildings were single story, some of the dealers used mezzanines for office or storage areas. There were no platforms for loading or unloading.

Space for parking 100 cars was provided at the main entrance to the market. Most of the wholesalers were in buildings number two, four, and five. Retail outlets occupied building one. Building three was used for box storage. Building six was occupied by nonfood firms.

Buildings one and two were destroyed by fire after this study was made (fig. 7). Building one was 350 feet long and 60 feet wide. A covered area 15 feet wide at the front of the building was used for display purposes. The retail operators who conducted business in building one handled fresh fruits and vegetables, meat, fish, or a limited line of grocery items. Many specialized in oriental food products.

Building two had 21 stalls, each 18 feet wide and 60 feet deep. One stall was used as a passageway and another for restroom facilities. The building was about 380 feet wide and 60 feet deep.

Building three was used by dealers in buildings two and four, primarily as a carton and box storage area. One-half of this building was used by dealers in building two and the other half by dealers in

[4] State of Hawaii, Department of Land and Natural Resources. The Interim Plan for Development--The Food Distribution Center at Fort Armstrong. 18 pp., illus. February 1966.

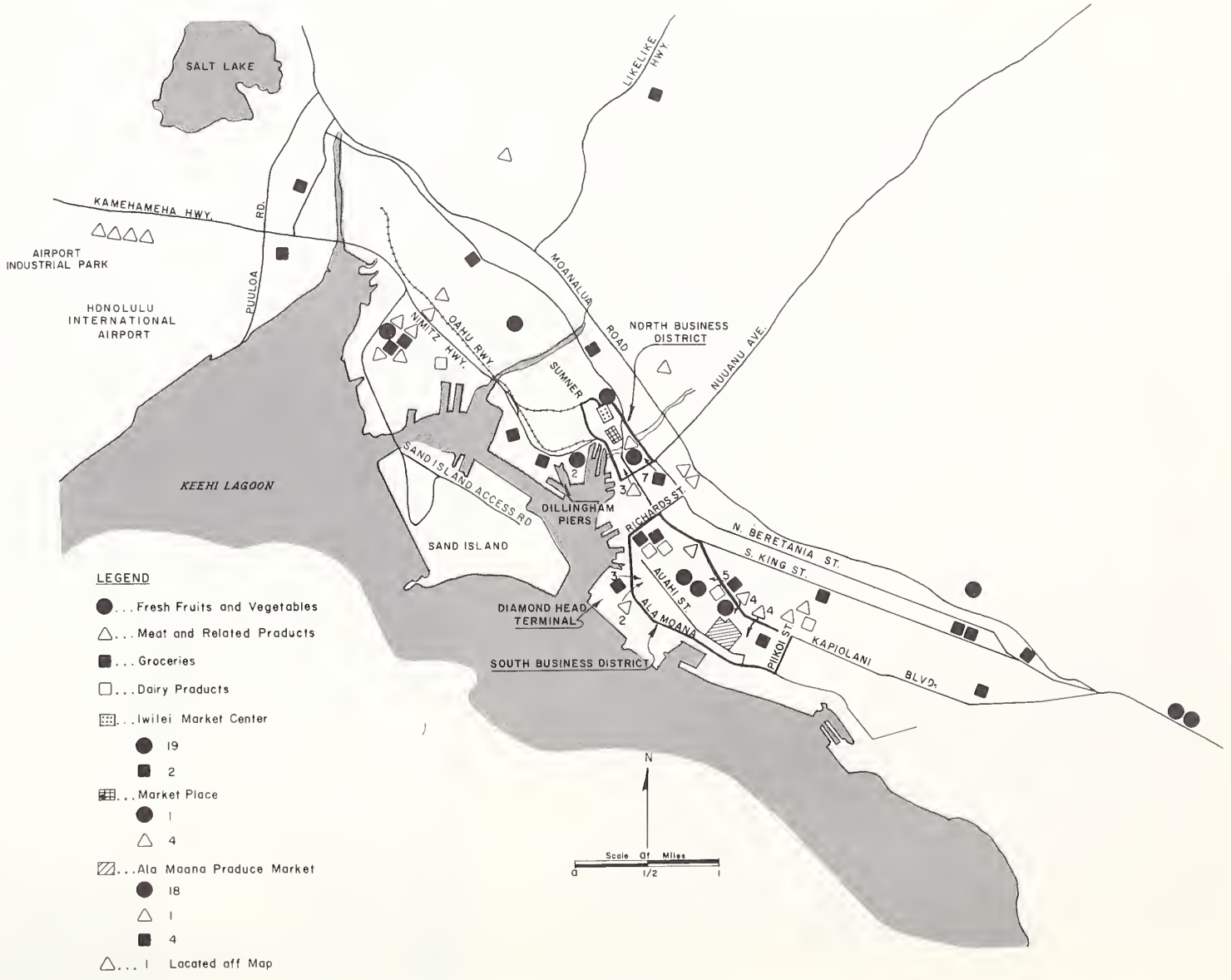

FIGURE 6.--Location of wholesale food firms in Honolulu.

FIGURE 7.--A, Ala Moana produce market before the fire; B, Ala Moana produce market after the fire on July 27, 1966.

building four; the space used by the dealers was in proportion to the number of stalls they rented in the other buildings. This shed-type structure was not enclosed, and the floor was at street level. It was used at one time as a covered parking area for vehicles.

Building four consisted of 24 stalls, each 18 feet wide by 60 feet deep. Two bays were used as passageways. This building was approximately 400 feet long and 60 feet deep. The street between buildings three and four was 40 feet wide.

In other parts of the South Business District wholesalers are located in various types of buildings. These range from modern single-story buildings designed for specific needs to old multistory buildings that were never intended for food distribution purposes. In this area most of the streets are narrow and, therefore, traffic congestion can be a serious problem.

The North Business District

The North Business District is on the north side of Nuuanu Avenue near Honolulu Harbor. It is bounded on the northwest by the Oahu Railway, on the northeast by North Beretania Street, on the southeast by Nuuanu Avenue, and on the southwest by Nimitz Highway and Sumner Avenue. The area includes the Iwilei Market center and the Market Place.

There are 38 food wholesalers in this district: 21 fresh fruit and vegetable firms, eight meat and related products firms, and nine grocery firms. The Iwilei Market, a principal wholesale produce market, houses 21 wholesalers.

The main building of the Iwilei Market is approximately 300 feet long and 90 feet wide, plus a section housing refrigeration equipment at one end. It has 28 stalls, 14

on each side facing out, and each stall is 21 feet wide and 45 feet deep. There are no platforms for loading or unloading. A 15-foot overhang provides a covered display and work area. The exterior and roof of the building are covered with corrugated metal sheeting.

There are 14 individual coolers located away from the main building--eight to the north and six to the south of the building. These units contain a total of over 8,000 square feet of refrigerated space. The street on the north side of the market is 36 feet wide and the one on the south side, 50 feet wide.

The Market Place, a multistory building near Nuuanu Stream, houses a number of small independent retailers who conduct business in stalls. Five firms operating from this building were classed as wholesalers and included in this study.

Other wholesalers operate at scattered locations throughout the North Business District. These facilities range from relatively modern to "make-do" structures used by dealers with small volumes of business.

Other Honolulu

Except for fresh fruits and vegetables, there are no well-defined market areas in the city. Some dealers are located in the same general area, but usually by chance, not design. Minor concentrations of firms are located at the Airport Industrial Park and near Sand Island Access Road.

There are 41 "other Honolulu" wholesalers scattered throughout the city and the island of Oahu. Seventeen firms handle meat and related products, 14 are grocery wholesalers, two are dairy products and egg wholesalers, and eight are fresh fruit and vegetable firms. Many of the firms do a considerable amount of processing.

A few firms have renovated their facilities in recent years and improved their operating efficiency to some degree. The design of many of the buildings is such that attempts to improve conditions are limited by the original building design.

Very few wholesalers operate in facilities that permit a high degree of operating efficiency, and fewer wholesalers have sufficient parking space for the customers' and the firm's trucks.

Ownership and Space Utilization

Only 18 (or 14 percent) of the firms in the study owned the facilities they occupied; the rest (86 percent) rented their facilities.

Table 2 shows the number of wholesalers owning and renting the facilities they occupied and the space occupied.

Total space for the 130 firms was 842,491 square feet. Of this, 87 percent was first floor space. Space on other floors was generally used for offices or for general storage.

Approximately 85 percent of the space used by fresh fruit and vegetable wholesalers was first floor space. These firms averaged only 700 square feet of refrigerated space.

Of the total space occupied by meat and related products firms, about 44 percent was refrigerated. A few firms operated directly from leased space in public cold storage facilities.

Grocery firms occupied more space than other food groups because they handled more items and because turnover was slower. The average space per firm was 11,400 square feet.

The five dairy products and egg firms occupied approximately 3,950 square feet of space per firm. These firms had nearly 1,600 square feet of refrigerated space.

Public Cold Storage Warehouses

Over 2.1 million cubic feet of refrigerated cooler and freezer space was available in three public refrigerated warehouses. One

TABLE 2.--Tenure status of and space used by wholesale food firms, by type of wholesaler, Honolulu, 1964

Type of wholesaler	Tenure status			Space occupied				Special use		
	Rent	Own	Total	First floor	Other floors	Total	Average per wholesaler	Cooler	Freezer	Office
	No.	No.	No.	Sq. ft.	Sq. ft.	Sq. ft.	Sq. ft.	Sq. ft.	Sq. ft.	Sq. ft.
Fresh fruits and vegetables	48	2	50	136,894	23,486	160,380	3,208	34,140	900	12,835
Meat and related products..	30	7	37	203,230	25,848	229,078	6,191	50,727	49,466	20,279
Groceries.....	30	8	38	373,488	59,790	433,278	11,402	16,465	36,524	32,251
Dairy products and eggs....	4	1	5	18,955	800	19,755	3,951	1,580	--	1,650
Total or average.....	112	18	130	732,567	109,924	842,491	6,481	102,912	86,890	67,015

of the three warehouses had less than 500,000 cubic feet of refrigerated space.

One firm occupied a warehouse that was built in two sections; one section was much older than the other. There were no dock facilities and all loading and unloading was conducted in the open. All products were transported into the cold storage facility by forklift.

Another cold storage firm occupied two buildings, which faced each other with a street between them. Extreme congestion in the area and a small loading dock make the handling of food products difficult and expensive.

In 1963, a mainland firm built a public cold storage facility in Honolulu. The facility has a canopied dock at truckbed height with a 36-truck capacity. The facility was built for mechanized handling equipment and for moving and storing products on pallets. It is the largest of the public cold storage facilities in the city and the most modern.

VOLUME OF RECEIPTS AND NUMBER OF WHOLESALERS

The estimated total volume of commodities received in Honolulu by the 130 independent dealers was slightly under 230,500 tons. The grocery firms received 46 percent of the total tonnage; fresh fruits and vegetable firms, 30 percent; meat and related products firms, 23 percent; and dairy products and egg firms, 1 percent. This last percentage represents only those firms that specialized in this product line; other types of wholesalers also handled dairy products and eggs. Receipts and commodities by market and number of dealers are given in table 3.

A dealer was considered a wholesaler if 50 percent of the volume handled was distributed to retailers, jobbers, or other wholesalers. A firm that distributed occasionally to retail or wholesale outlets, but primarily conducted a retail business, was classified as a retail firm and was, therefore, not included in this study.

Dealers in each commodity group were classified according to type of operation and services performed. Classifications were made to determine facility needs of individual firms and to provide a basis for recommendations for improvement. Table 4 shows the number and type of dealers, by commodity group and market area.

TABLE 4.--Number and type of independent food wholesalers, by market area, Honolulu, 1964

Type of wholesaler and type of operation	South Business District	North Business District	Other Honolulu	Total
	Number	Number	Number	Number
Fresh fruits and vegetables:				
Container receivers	7	7	--	14
Commodity specialists	2	--	2	4
Wholesaler-jobbers	12	14	6	32
Total	21	21	8	50
Meat and related products:				
Wholesalers	9	3	10	22
Processors	2	4	4	10
Purveyors	1	1	3	5
Total	12	8	17	37
Grocery:				
Container receivers	2	1	4	7
Wholesaler-jobbers	1	3	2	6
Importers	5	3	2	10
Commodity specialists	7	2	6	15
Total	15	9	14	38
Dairy products and eggs	3	--	2	5
Total independent wholesalers	51	38	41	130

Fresh Fruits and Vegetables

Fresh fruit and vegetable wholesalers were classified as container receivers, wholesaler-jobbers, or commodity specialists in this report.

Container receivers were firms who handled full containers of products from

TABLE 3.--Number of independent food wholesalers and volume of direct receipts, by type of wholesaler and market area, Honolulu, 1964

Type of wholesaler	South Business District		North Business District		Other Honolulu		Total	
	Wholesalers	Volume	Wholesalers	Volume	Wholesalers	Volume	Wholesalers	Volume
	Number	Tons	Number	Tons	Number	Tons	Number	Tons
Fresh fruits and vegetables	21	37,304	21	21,766	8	9,213	50	68,283
Meat and related products	12	26,195	8	4,966	17	21,108	37	52,269
Groceries	15	13,600	9	17,106	14	76,523	38	107,229
Dairy products and eggs	3	1,818	--	--	2	895	5	2,713
Total	51	78,917	38	43,838	41	107,739	130	230,494

shipping points. These wholesalers usually carried a full line of fresh fruits and vegetables. They received approximately 72 percent of their volume in containers. About 54 percent of their volume came from the mainland United States, 29 percent from neighboring islands, 12 percent from Oahu producers, and only 5 percent from other wholesalers. These firms sold to chainstores, independent grocery stores, restaurants, and the military.

Wholesaler-jobbers were firms who purchased approximately 74 percent of their volume from producers on Oahu and neighboring islands. They purchased about 8 percent of their volume from other wholesalers. Most of their receipts were by flatbed truck from Oahu producers or from the docks. Only 18 percent of their volume was received by container. The average size of these firms was much smaller than that of container receivers. They sold their products to chainstores, independent grocery stores, and restaurants.

Commodity specialists were firms that did some type of processing and specialized in one product. Some of the functions were ripening, grading, and packaging consumer items. They received approximately 78 percent of their volume by container. Ninety-eight percent of their products came from the mainland United States and the other 2 percent from producers on the neighboring islands. They sold most of their volume to restaurants, institutions, and chainstores.

Meat and Related Products

Wholesalers of meat and related products usually received most of their products from the mainland United States and foreign countries. They used containerized shipments extensively. Most firms received products in boxes, but some received meat carcasses, which they broke, cut, and occasionally boned. Approximately 31 percent of the volume handled by these firms was not meat or poultry. They sold most of their volume to restaurants, chainstores, and independent grocery stores. About 2 percent was sold to meat purveyors.

Processors usually handled products that required some alteration, including slaughtering by some firms. They purchased a large part of their products from Oahu and neighboring islands but very little from other wholesalers. Approximately 34 percent of their volume was not meat or poultry. They sold primarily to chainstores and restaurants.

Most purveyors received their products from Oahu producers or other wholesalers. Most of these firms had small volumes and usually handled only meat or poultry products. They supplied products to specification, in bulk or in small lots, and sold most of their volume to restaurants and chainstores.

Groceries

In this report groceries refer to food and nonfood items commonly found in retail stores, with the exception of seafood, fresh meat and related products, poultry, eggs, and dairy products, fresh fruits and vegetables, frozen food, and bakery products. Four grocery firms also handled the excepted products mentioned above, but these products were a minor part of their business.

Container receivers were large-volume firms that received a major part of their volume by container from the mainland United States. These firms did not specialize in a single function and usually handled a general line of grocery products.[5]

Wholesaler-jobbers were small grocery firms that usually received products by pool container shipments or at the break-bulk warehouse. These firms sold primarily to independent grocery stores and restaurants.

Importers were firms that received approximately 83 percent of their volume from foreign countries. Most of these products were oriental. All the firms handled smaller volumes than the container receivers.

Commodity specialists handled one line of grocery products. Many of these firms did a considerable amount of processing. They were similar to importers in many respects, but they imported less than 3 percent of their volume from foreign countries and received most of their tonnage from the mainland United States. All of these firms received smaller volumes than the container receivers.

Dairy Products and Eggs

The firms that specialized in dairy products and eggs handled only 24 percent of the volume of these products; the major

[5] A general line consists of 2,000 to 5,000 items, including such nonfood products as soap, paper products, and other household goods.

portion was handled by meat and related products wholesalers. The firms specializing in dairy products and eggs received more than 80 percent of their products from Oahu and the neighboring islands; the remainder came from the mainland United States. These firms sold to chainstores, restaurants, and the military.

FLOW OF FOOD PRODUCTS THROUGH WHOLESALE FACILITIES

Incoming food shipments were received at Diamond Head Terminal, Dillingham piers, and to a lesser degree, other harbor facilities on the leeward side of the island. From these points the food was delivered direct to the dealers' facilities, held at the container yard for delivery, or transferred to the break-bulk station. Some commodities, which required refrigeration, were moved from the dock area to public refrigerated warehouses to be stored until needed by the dealer.

Food products that were moved into wholesale facilities were displayed, held for sale, or processed before sale. After the sales transaction, merchandise was loaded onto the buyers' or sellers' trucks for delivery.

Approximately 96 percent of all food commodities handled by independent wholesalers was moved through the firms' facilities. Container shipments accounted for almost 60 percent of direct receipts; about 92 percent of the container volume was taken directly to the wholesalers' facilities in the original container. Many meat and related products firms and some fresh fruit and vegetable wholesalers processed their receipts in some manner. Honolulu wholesalers tended to store products at their facility longer than dealers on the mainland.

Sale and transfer of products between wholesalers meant handling some foods twice. Interdealer transfers amounted to 8,667 tons, or 3.8 percent of all direct receipts handled by the independent wholesalers (table 5). The total volume handled by wholesalers--direct receipts plus interdealer transfers--was 239,161 tons.

Honolulu food wholesalers distributed approximately 72 percent of their receipts within the city. About 21 percent went to other parts of Oahu, 5 percent to neighboring islands, and 2 percent to other areas, such as the mainland United States. Fruits and vegetables--fresh, canned, or frozen--were the main products shipped to other areas. Following are the estimated volumes distributed to the various areas:

TABLE 5.--Volume of direct receipts and interdealer transfers of food, by type of wholesaler and market area, Honolulu, 1964

Receipts, transfers, and total volume handled	South Business District	North Business District	Other Honolulu	Total
FRESH FRUITS AND VEGETABLES	Tons	Tons	Tons	Tons
Direct receipts	37,304	21,766	9,213	68,283
Interdealer transfers	2,896	771	524	4,191
Total volume handled	40,200	22,537	9,737	72,474
MEAT AND RELATED PRODUCTS				
Direct receipts	26,195	4,966	21,108	52,269
Interdealer transfers	608	1	149	758
Total volume handled	26,803	4,967	21,257	53,027
GROCERIES				
Direct receipts	13,600	17,106	76,523	107,229
Interdealer transfers	2,253	457	1,008	3,718
Total volume handled	15,853	17,563	77,531	110,947
DAIRY PRODUCTS AND EGGS				
Direct receipts[1]	1,818	0	895	2,713
ALL COMMODITIES				
Direct receipts	78,917	43,838	107,739	230,494
Interdealer transfers	5,757	1,229	1,681	8,667
Total volume handled	84,674	45,067	109,420	239,161

[1] No interdealer transfers were reported.

Area or outlet	Tons
Honolulu City	166,223
Other Oahu:	
Kailua area (Kailua, Kahuku, Kaneohe, Waimanolo, and surrounding area)	18,911
Aiea area (Aiea, Pearl City, Waipaho, and surrounding area)	11,661
Wahiawa area (Wahiawa, Hunia, Whitmore, and surrounding area)	7,349
Waiane area (Waiane, Lualualei, Nanokuli, Mokalia, and surrounding area)	4,115
Ewa area (Ewa, Ewa Beach, Honouluili, and surrounding area)	3,332
Haleiwa area (Haleiwa, Kawailoa, Mokuleia, Waialua, and surrounding area)	2,008
Laie area (Laie, Hanula, Kaaawa, Kahana, Kahuku, Manaiwai, and surrounding area)	1,617
Total	48,993

Area or outlet	Tons
Other counties:	
Hawaii	5,146
Kauai (Islands of Kauai, and Niihau)	2,357
Maui (Islands of Maui, Molokai, and Lanai)	3,563
Total	11,066
Mainland United States and foreign countries	4,212
Grand total	230,494

Fresh Fruits and Vegetables

Direct receipts of fresh fruit and vegetable wholesalers were approximately 68,300 tons. (See table 1, p. 7.) About 94 percent of the volume received in Honolulu in containers was moved from the docks to the wholesalers' facilities in the original containers. The products received by barge from neighboring islands and those purchased from Oahu producers were moved to wholesalers' facilities by truck.

Interdealer movement amounted to 6 percent of the volume. This movement was necessary because sometimes firms were unable to fill their orders, and they made up the needed volume by purchases from other wholesalers. Some fresh fruit and vegetable wholesalers in Honolulu act as brokers as part of their overall business. The volume they sell to other wholesalers was considered interdealer movement.

Fruit and vegetable wholesalers distributed almost 79 percent of their volume within the city limits of Honolulu, 14 percent to other parts of Oahu, and 1 percent to neighboring islands. Six percent went to foreign countries or the mainland United States.

Meat and Related Products

Total direct receipts of meat and related products in Honolulu amounted to 52,269 tons. (See table 1, p. 7.) Approximately 86 percent of the volume received by container was delivered to the wholesalers' facilities in the original containers. Products received by barge from neighboring islands and by general maritime cargo and those purchased from Oahu producers were delivered by truck.

Interdealer movement was relatively minor for meat and related products firms--about 1.5 percent of direct receipts.

Meat and related products firms distributed over 68 percent of their volume within the city of Honolulu, 21 percent to other areas in Oahu, about 11 percent to the neighboring islands, and minor amounts to other areas.

Groceries

Grocery wholesalers received an estimated 107,229 tons of products in 1964. (See table 1.) About 92 percent of the tonnage shipped by container was moved from the docks to dealers' facilities in the container. Food products were moved by regular truck except when the containers were delivered to the dealers' facilities.

Interdealer movement, principally specialty items, was approximately 1 percent.

Grocery firms sold about 70 percent of their volume in Honolulu, 26 percent to other Oahu areas, 4 percent to the neighboring islands, and very little to other areas.

Dairy Products and Eggs

Firms specializing in dairy products and eggs handled 2,713 tons of food in 1964. (See table 1.) Only about 20 percent of the volume that arrived in Honolulu by container went to the dealers' facilities in the container. All products, except those delivered in containers to wholesalers' facilities, were moved by truck.

Interdealer movement was minor because of the large amount purchased from local sources.

These firms sold 77 percent of their volume in the city and almost 23 percent to other Oahu areas. Sales to other areas were minor.

SELECTED COSTS INCURRED BY WHOLESALERS

Honolulu food wholesalers can point to some excellent examples of modern handling methods in their food distribution system. In many instances, however, modern handling equipment is misused or used inefficiently because antiquated facilities restrict its proper use or the wholesaler is not adapting the proper equipment to his specific operation. Inefficient facilities and poor choices in handling equipment are

costly to producers, consumers, and market operators.

Some of the costs of handling food that are affected by the wholesaler's facility and the equipment he uses are estimated here. Costs are estimated for (1) moving food from the first point of arrival to the wholesale facility, (2) handling within the market, and (3) distributing food. They will be compared later in the report with the costs that might be expected in improved facilities. The costs of electricity, water, telephone, and similar items are not included because they will remain about the same regardless of the facility.

Moving Food From First Point of Arrival to Wholesale Facilities

Costs from point of arrival to wholesale facilities consist of cartage from docks and airport, container fees, and avoidable delay to trucks.

Cartage costs are the costs of loading commodities into trucks at warehouses at the docks, airport, or break-bulk station, and moving them to the wholesale facility. Estimates are given both for firms that use their own trucks for this operation and for those that hire cartage firms.

The Hawaii Public Utilities Commission established the container fee, and the rate per container applies to any location within the city. Any container moving over public streets in Honolulu is subject to this rate. Products that originate on the island of Oahu are not subject to this fee.

Avoidable delays to inbound trucks occurred when products were moved to certain locations within market areas. Less than one-half of all products were involved in these delays.

Total estimated cost for moving products to wholesalers' facilities was $627,364, or $2.83 per ton, for the 221,362 tons involved (table 6). The remainder of the direct receipts--9,132 tons--was loaded directly into buyers' trucks at the docks and airport; the cost for this handling is included in labor costs for handling within the market areas.

TABLE 6.--Estimated annual cost of moving food commodities to wholesalers' facilities, Honolulu, 1964[1]

Commodity	Volume	Cost	
		Per ton	Total
	Tons	Dollars	Dollars
Fresh fruits and vegetables....	66,810	3.37	225,003
Meat and related products.....	49,472	3.43	169,789
Groceries.....	102,367	2.08	212,637
Dairy products and eggs.....	2,713	7.35	19,935
Total or average.....	221,362	2.83	627,364

[1] Container fees, cartage from docks and airport, and avoidable delay to inbound trucks; see appendix, table 20.

Handling Within the Market Areas

Costs computed for handling within the markets were for labor and equipment, rentals and off-premise storage, and avoidable spoilage.

Labor costs were estimated for (1) unloading inbound vehicles, including trucks from producers on Oahu and containers delivered to wholesale facilities, (2) loading buyers' trucks at the docks and airport, (3) moving commodities from one dealer to another, either by truck or handtruck, (4) handling within the facility, and (5) loading outbound trucks for delivery. Handling within the facility includes moving commodities to and from storage, selecting orders, setting up displays, and some processing.

Many of the food wholesalers used handling equipment extensively. The estimated annual cost for labor and equipment was nearly $3.5 million (table 7).

TABLE 7.--Estimated annual cost of labor and equipment use in present facilities, by type of wholesaler, Honolulu, 1964[1]

Commodity	Volume	Cost	
		Per ton	Total
	Tons	Dollars	Dollars
Fresh fruits and vegetables....	68,283	8.86	604,821
Meat and related products.....	52,269	30.45	1,591,431
Groceries.....	107,229	10.86	1,166,364
Dairy products and eggs.....	2,713	17.14	46,501
Total or average.....	230,494	14.79	3,409,117

[1] See appendix table 20.

Actual rents paid by wholesalers renting their facilities, using any type of lease, were determined. For dealers who owned their facilities, rent was estimated by averaging rents for similar space in the immediate area. Average annual rental value among the different commodity groups ranged from $0.78 to $1.30 per square foot. Variations in rent were due in part to location and the adequacy and age of the buildings.

Charges for the use of public warehouses and other off-premise storage amounted to $50,219 (table 8). The total annual rent and off-premise storage amounted to $869,511, or $3.78 per ton.

Numerous handling operations in moving a product from the producer to the con-

TABLE 8.--Estimated annual cost of rent and off-premise storage in present facilities, by type of wholesaler, Honolulu, 1964[1]

Type of wholesaler and cost item	Volume[2]	Cost	
		Per ton	Total
FRESH FRUITS AND VEGETABLES	Tons	Dollars	Dollars
Rent	71,001	2.94	208,622
Off-premise storage[3]	(5,883)	3.21	18,875
Total or average	71,001	3.20	227,497
MEAT AND RELATED PRODUCTS			
Rent	50,230	4.99	250,634
Off-premise storage[3]	(3,727)	5.24	19,537
Total or average	50,230	5.38	270,171
GROCERIES			
Rent	106,085	3.17	336,126
Off-premise storage[3]	(2,295)	4.93	11,323
Total or average	106,085	3.28	347,449
DAIRY PRODUCTS			
Rent	2,713	8.81	23,910
Off-premise storage[3]	(37)	13.08	484
Total or average	2,713	8.99	24,394
ALL COMMODITIES			
Rent	230,029	3.56	819,292
Off-premise storage[3]	(11,942)	4.21	50,219
Grand total or average	230,029	3.78	869,511

[1] See appendix table 20.
[2] Excludes tonnages picked up by customers at docks and airport; includes interdealer transfers.
[3] Off-premise storage and avoidable spoilage are not included because complete cost estimates for refrigeration are not given.

TABLE 9.--Estimated annual cost of avoidable spoilage in present wholesale facilities, Honolulu, 1964[1]

Commodity	Volume	Cost	
		Per ton	Total
	Tons	Dollars	Dollars
Fresh fruits and vegetables	66,810	3.28	219,137
Meat and related products	49,472	4.92	243,403
Groceries	102,367	2.25	230,326
Dairy products and eggs	2,713	1.02	2,767
Total or average	221,362	3.14	695,633

[1] Includes applicable cartage.

sumer contribute to spoilage losses. In Hawaii there are few truckbed-level platforms; therefore, several hand-stacking operations are performed that tend to bruise fresh food and cause breakage or damage losses of other food items. Avoidable spoilage averaged $3.14 per ton. The spoilage rate for fresh fruits and vegetables was relatively high because of inadequate facilities and because wholesalers hold commodities for long periods of time. Total losses from avoidable spoilage amounted to $695,633 (table 9).

Total cost of handling within the market areas was $4,228,409, or $18.34 per ton.

Distribution From the Market Areas

The cost of distributing commodities includes the costs from the time the trucks are loaded at the wholesale facility until they reach their destination. These costs were computed for ownership and operation of the motor vehicle and for the labor costs of driver or crew. Any lost time due to traffic congestion was included in these costs.

Total distribution costs were estimated at about $1,200,000, an average of $5.65 per ton (table 10).

TABLE 10.--Estimated annual cost of distributing foods from present facilities, Honolulu, 1964[1]

Commodity	Volume[2]	Cost	
		Per ton	Total
	Tons	Dollars	Dollars
Fresh fruits and vegetables	65,796	5.70	375,260
Meat and related products	46,042	7.75	356,889
Groceries	97,720	4.46	435,772
Dairy products and eggs	2,713	11.84	32,108
Total or average	212,271	5.65	1,200,029

[1] See appendix table 20.
[2] Excludes merchandise picked up by the customer at the wholesale facility.

Summary of Selected Marketing Costs

Total selected costs for moving 230,494 tons of food through present Honolulu wholesale facilities was an average of $26.27 per ton, or $6,055,802 (table 11). The highest costs were in handling operations. Improvements in the marketing system would reduce these costs.

TABLE 11.--Summary of estimated annual cost of moving 230,494 tons of foods through present facilities, Honolulu, 1964

Cost item	Fresh fruits and vegetables	Meat and related products	Groceries	Dairy products and eggs	Total
	Dollars	Dollars	Dollars	Dollars	Dollars
Movement to wholesalers' facilities....	225,003	169,789	212,637	19,935	627,364
Handling within the market:					
Labor and equipment.....	604,821	1,591,431	1,166,364	46,501	3,409,117
Rentals.....	208,622	250,634	336,126	23,910	819,292
Off-premise storage[1].....	18,875	19,537	11,323	484	50,219
Avoidable spoilage[1].....	219,137	243,403	230,326	2,767	695,633
Total handling[1].....	813,443	1,842,065	1,502,490	70,411	4,228,409
Distribution from market areas.....	375,260	356,889	435,772	32,108	1,200,029
Grand total[1].....	1,413,706	2,368,743	2,150,899	122,454	6,055,802

[1] Off-premise storage and avoidable spoilage are not included in totals because complete cost estimates for refrigeration are not given.

INADEQUACIES OF PRESENT WHOLESALE MARKETING FACILITIES IN HONOLULU

Lack of a Concentrated Market

Lack of a concentrated or centralized wholesale market creates inefficiency in the distribution of food products in Honolulu. Dealers in the same commodity are grouped together in only a few areas; and narrow streets, poor location, and inefficient facilities make these areas ineffective in performing the function of a concentrated market.

Some dealers maintain operations in more than one location. Split operations increase their operating and cartage costs and prevent them from gaining a clear knowledge of supply and demand for their products. The more accurate and complete the information buyers and sellers have concerning supply and demand, the more competitive will be the price established and the more readily will food commodities be moved into market channels.

Scattered locations of food wholesalers cause unnecessary rehandling and transporting of products. Additional rehandling causes unnecessary spoilage and product deterioration. These inefficiencies are reflected in high operating costs to the wholesaler and higher prices to the consumer.

Inadequate Buildings

Inadequate and poorly designed buildings add to the costs of marketing food products largely because more labor is required to perform tasks that could be done more simply and economically.

Some firms have renovated their buildings in attempts to modernize them, but many are not suitable for the efficient handling of food products. The design of many of the facilities restricts the use of modern handling methods. Others cannot be economically adapted to modern handling practices.

Most buildings are crowded and lack adequate work and storage areas, and the main floors are at street level. Except for wholesale meat or public cold storage facilities, few buildings have truckbed-level platforms.

In many instances, the electrical service, plumbing, and ventilation, do not meet the dealers' needs. In most of the facilities, changes to meet these requirements are neither practical nor economical.

Many perishable food facilities have inadequate refrigeration. Few have equipment for humidity control. Proper humidity controls have more than offset their cost in some facilities by reducing shrinkage of fresh meats and prolonging shelf life of fresh fruits and vegetables.

Inconveniences caused by inadequate facilities, long operating hours, substandard sanitation, poor working conditions, and lack of adequate safety precautions add to the cost of moving foods through wholesale facilities.

Duplication of Functions

There are many small-scale wholesale food firms in Honolulu. These firms fill

a need in the distribution of food products in the State. But, because each has its own building area, delivery service, refrigeration, and handling equipment, costs are unnecessarily high. In a centralized market these firms could act cooperatively and reduce costs. For example, a central delivery service could be established by the small wholesalers. This type of delivery service could replace present methods whereby each wholesaler must bear the expense of operating his own truck. Other related inefficiencies would be eliminated, such as retracing delivery routes by firms that operate from the same market.

Refrigeration is another area where savings may be realized in new facilities through the use of common coolers or possibly the installation of central refrigeration. In many instances, refrigeration is inadequate because the initial cost of the equipment is too great.

Pooling of modern handling equipment, such as forklifts, might also reduce costs. There are other possibilities, but those mentioned offer the greatest potential for reducing duplication of functions.

Lack of Adequate Streets and Parking Areas

There are no rail facilities to the markets in Honolulu; motor vehicles carry all products to and from the wholesale stores. In some areas only a single lane may be available for moving vehicles. During business hours truckers may have excessive waiting periods because trucks are being loaded and unloaded in the streets.

Tailboard space and maneuvering area are inadequate. There are few facilities where loading and unloading operations can be performed at the same time.

Almost all facilities used for wholesale food marketing lack adequate parking space for buyers, employees, owners, shippers, and others using the market. Most buildings with rear entrances do not use them, and all loading and unloading is done through the front entrance. Because of the narrow streets, trucks park parallel to the buildings and the number that can be loaded or unloaded at one time is limited.

Improper Handling Methods

In present facilities only limited use of forklifts and other modern handling equipment is possible. Perishable products such as fresh fruits and vegetables and, at times, frozen foods are transported in open vehicles exposed to high temperatures and rain. In many instances, not even a tarpaulin is provided for protection. In some warehouses pallet loads are piled or set wherever space is available. They block aisles and slow all operations. Because of congestion, food is smashed and otherwise mishandled in storage.

Honolulu and the State of Hawaii are experiencing economic growth. Broader utilization of labor-saving devices in food handling can be expected in the future, but present facilities restrict their use.

Lack of Market Regulation and Enforcement

A wholesale market must function as a unit if it is to serve a distribution area efficiently. Individual dealers should have freedom in conducting their business. But they, as well as firms patronizing and servicing the markets, usually find it to their advantage to establish some regulations for all to observe.

When segments of a market are scattered, as in Honolulu, a common organization to enforce regulations that govern market operations and practices is impossible. Since the wholesale facilities in Honolulu are on public streets or thoroughfares, it is difficult to control traffic for the benefit of the dealers or to establish uniform hours of operation. The lack of control over the hours of operation means longer workdays, excessive exposure of perishable products to high temperatures, and greater price fluctuations during selling periods. Without definite market hours, buyers do not know when they will find the greatest selection and highest quality of produce. Regulations are needed for sanitation, police and fire protection, and other services provided by the municipality.

HOW WHOLESALE FOOD FACILITIES CAN BE IMPROVED

The best solution for the many defects of the wholesale food market in Honolulu would be to construct new centralized facilities adapted to the specific needs of

Hawaii. Wholesalers in this type of development could expect reductions in their operating costs. The city, State, local producers, retailers, and consumers could benefit from a new centralized market. The development should be designed for present and future needs.

This section of the report presents the basic concepts for planning and constructing a food distribution center for Honolulu. Facilities recommended are based upon the needs of firms that would be expected to move into the proposed development. Expansion areas for these and other wholesalers are based upon projected requirements. Factors that were considered in site evaluation and selection will be noted in a subsequent chapter.

Facilities Needed

Only the facilities needed for the volume handled by responsible tenants who actually sign leases should be constructed. This precaution will prevent overbuilding and insure occupancy of all facilities.

Facilities in a new food distribution center at Fort Armstrong are recommended for 71 independent wholesalers. Other firms would also benefit by moving to new facilities, but they would be unwilling or unable to relocate in the initial development because of lease commitments or other reasons. Some of these firms are considered to be prospective tenants at some future date. Some independent wholesale firms occupy facilities sufficient to meet their immediate needs and would not benefit from a move at present. Facilities are not planned for these firms nor for wholesalers who operate partly as retailers and who might lose their retail business if they moved.

Two basic types of buildings--multiple-occupancy and single-occupancy--are needed for wholesalers who will move to new facilities at Fort Armstrong. A multiple-occupancy building is designed for a number of firms with small to moderate volumes. A single-occupancy building is recommended if a firm needs more than 15,000 square feet of space.

The needs of the 71 firms included in initial planning could be met with the following:

1. Four multiple-occupancy buildings.
2. One single-occupancy building, containing 48,000 square feet.
3. Paved streets at least 200 feet wide where center of the street parking is provided.
4. Parking spaces for over 400 vehicles in addition to the loading and unloading space at the building platforms.
5. Space for allied industry and for construction of additional facilities as needed.
6. Space for a refrigerated warehouse.

The individual sections of the multiple-occupancy building are usually referred to as units. In some buildings, modifications have been made in the units to accommodate wholesalers with extremely small volumes. When such alterations have been recommended, the building is considered special purpose, but it can readily and inexpensively be converted to meet other needs.

Certain basic features are usually incorporated into the multiple-occupancy building. Figure 8 shows a plan and section view of a unit in a multiple-occupancy building.

The enclosed space of the unit is 25 feet wide and 72 feet deep, with an unobstructed stacking height of 20 feet. Platforms 14 feet deep at the front and rear make the overall depth of the unit 100 feet.[6] A 14-foot-deep mezzanine over the front platform may be used for either office or storage area. Stairs in the interior of the unit provide access to the mezzanine. Each unit contains 1,800 square feet of enclosed first floor space, 350 square feet of mezzanine space, and 700 square feet of platform space, for a total of 2,850 square feet.

First floor areas in the unit are concrete and have a nonskid surface. The live load capacity of the floor is 350 pounds per square foot. The main floor is sloped to drains.

Plumbing includes restrooms on the mezzanine.

Electrical outlets are provided where needed.

At the front of the unit is an 8-foot-wide overhead door and at the rear, an 8-foot-wide sliding door.

Removable or temporary partitions between individual units permit future expansion.

A ramp at one end of the multiple-occupancy building provides street access for equipment.

[6] For additional information on platforms, see "Platform Requirements," p. 26.

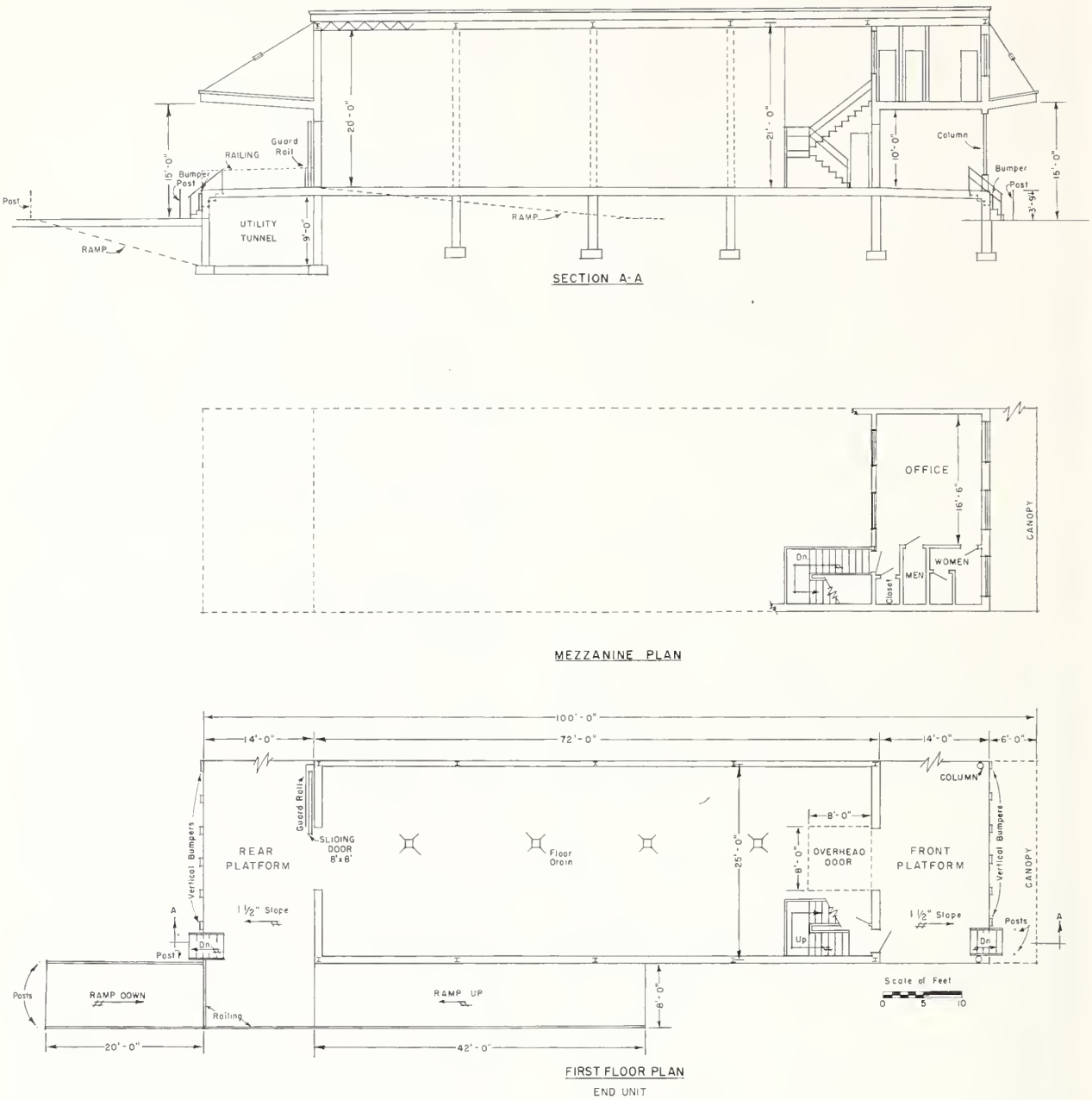

FIGURE 8.--Plan and section view of a unit in a multiple-occupancy building.

Space for refrigeration equipment is provided under the rear platform.

A ramp leads down to the equipment area from the street.

All dimensions and designs will be the same in the individual unit for all commodities unless otherwise noted.

Refrigeration differs substantially among dealers. Each firm should install its own refrigeration equipment.

Fresh Fruits and Vegetables

All fresh fruit and vegetable firms operating in the Ala Moana and Iwilei markets have been included in new facility plans at Fort Armstrong. A few dealers scattered throughout the city will not require new facilities immediately.

Two multiple-occupancy buildings with a total of 38 units are proposed for the 47 fresh fruit and vegetable firms considered as possible tenants on the new market.

One building with 26 units will house 20 fresh fruit and vegetable wholesalers. These firms handled 43,548 tons of fresh fruits and vegetables in 1964. First floor space for these dealers amounts to 65,000 square feet, with 9,100 square feet of mezzanine for offices or storage area.

The other multiple-occupancy building is the size of 12 full units, but the interior layout has been altered to accommodate 27 small-volume wholesalers. Because of the size and type of their operations, these wholesalers cannot economically conduct business in full units. Figure 9 shows the layout of this special-purpose building.

The exterior of the building is the same as that of the larger building. The interior is divided into a refrigerated area, for use by all the wholesalers, and individual stalls. The refrigerated area, at one end of the building, is the size of three units. An 11-foot-wide aisle, which runs the length of the rest of the building, has stalls on both sides. The aisle provides access to the refrigerated area and a walkway for buyers who shop the market.

The size of each stall should be determined by the space needs of the individual firm. Wire partitions screening individual stalls permit circulation of air throughout the building and provide a brighter interior. Front and rear platforms provide each wholesaler access to the receiving and shipping areas. Space over the front platform may be used for offices, storage, or restrooms by the wholesalers in the building or may be leased to outside tenants. Access to the mezzanine is by stairs from the front platform.

The 27 firms provided for in the special-purpose building handled 10,420 tons of fresh fruits and vegetables in 1964. The total space provided for these dealers is 30,000 square feet on the first floor and 4,200 square feet on the mezzanine.

Cooler facilities should be installed at the time of initial construction to meet the combined refrigeration needs of the dealers. The common cooler should provide different temperature ranges. Free-standing insulated walls with double-acting doors 6 feet wide are considered sufficient to separate the temperature ranges.

The special-purpose-building design is intended to be flexible to serve the changing needs of the tenants for the life of the facilities.

The total floor space planned for the 47 fresh fruit and vegetable wholesalers is 108,300 square feet--95,000 square feet of the first floor space and 13,300 square feet of mezzanine space.

Meat and Related Products

Eleven units in a multiple-occupancy building are for nine wholesale meat firms.

Because of Federal, State, and local ordinances and requirements about sanitation, design, and construction of meat processing plants, plans for new plants should be submitted to the proper authorities.

These units, like the unit described earlier, have mezzanines over the front platform. Units for meat and related product firms usually have second floors, but they are not recommended for Honolulu because most dealers handle boxed meats and the full height of the units may be used for stacking and moving loaded pallets.

Each unit should be completely insulated according to the temperature requirements of the individual firm. Space for refrigeration distribution systems is provided under the rear platform.

Floors should be either vitrified brick bonded with acid-resistant waterproof mortar and laid on a waterproof base or dense, acid-resistant waterproof concrete. All floors should slope to drains.

The floor should support a live load of 400 pounds per square foot, and the earth beneath the floor should be firmly compacted. If a freezer is needed, a crawl space should be provided under this part of the unit.

A hot-water system capable of supplying water at 160° F. should be provided for welfare and cleanup needs.

Meat rails, if needed, should be supported from the floor. These rails should be at least 7 1/2 feet, but not more than 9 feet, from the floor.

Figure 10 shows a plan and section view of a suggested meat and related products unit in a multiple-occupancy building.

All doors for forklifts or other types of handling equipment should be at least 8 feet high. Doors at both the front and rear of the unit are 6- by 8-foot sliding doors.

Total space for meat and related products firms is 31,350 square feet, of which 19,800 square feet is enclosed first floor space, 7,700 square feet is platform space, and 3,850 square feet is mezzanine space.

Groceries

One multiple-occupancy building containing 19 units and one single-occupancy

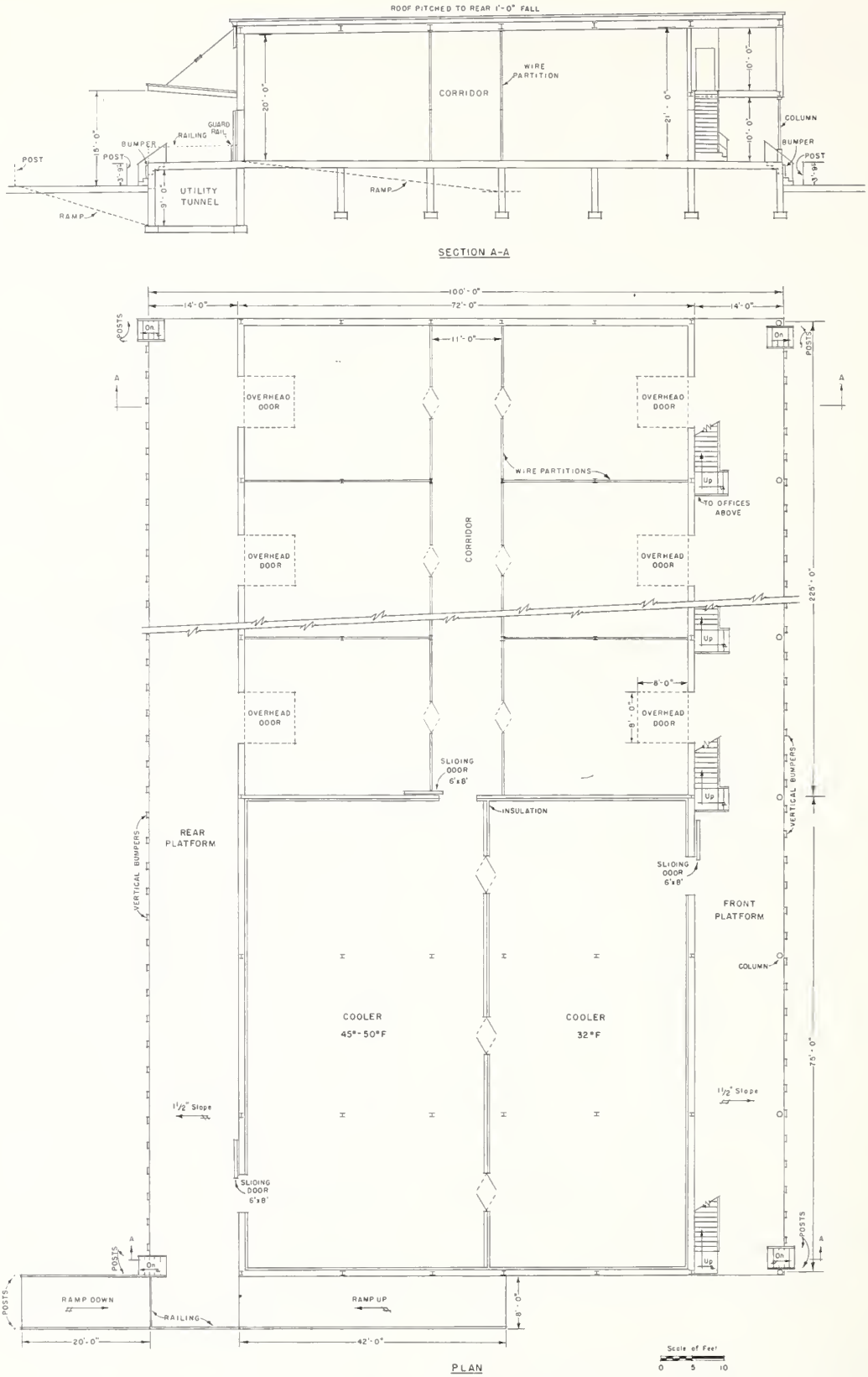

FIGURE 9.--Special-purpose, multiple-occupancy building.

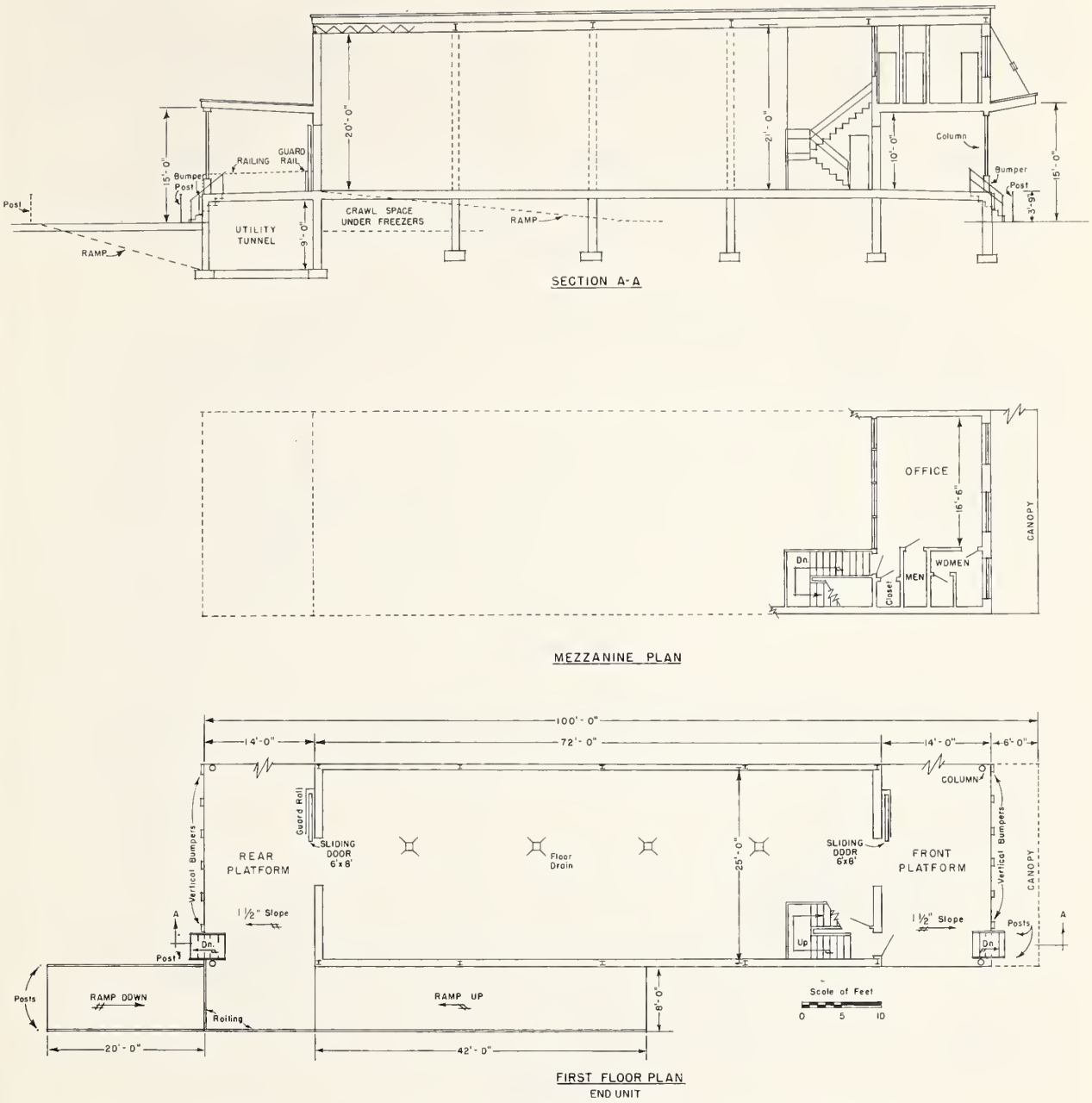

FIGURE 10.--Plan and section view of a suggested meat and related products unit in a multiple-occupancy building.

building are provided for 20 wholesale grocers. Figure 11 shows the layout of a unit in the multiple-occupancy building. Each unit would be as follows:

Dimensions:

30 feet wide and 86 feet deep

Mezzanine, 18 feet by 30 feet, at front of unit

Covered rear platform, 14 feet deep

Space (sq. ft.):

Enclosed first floor	2,580
Mezzanine	540
Rear platform	420
Total per unit	3,540

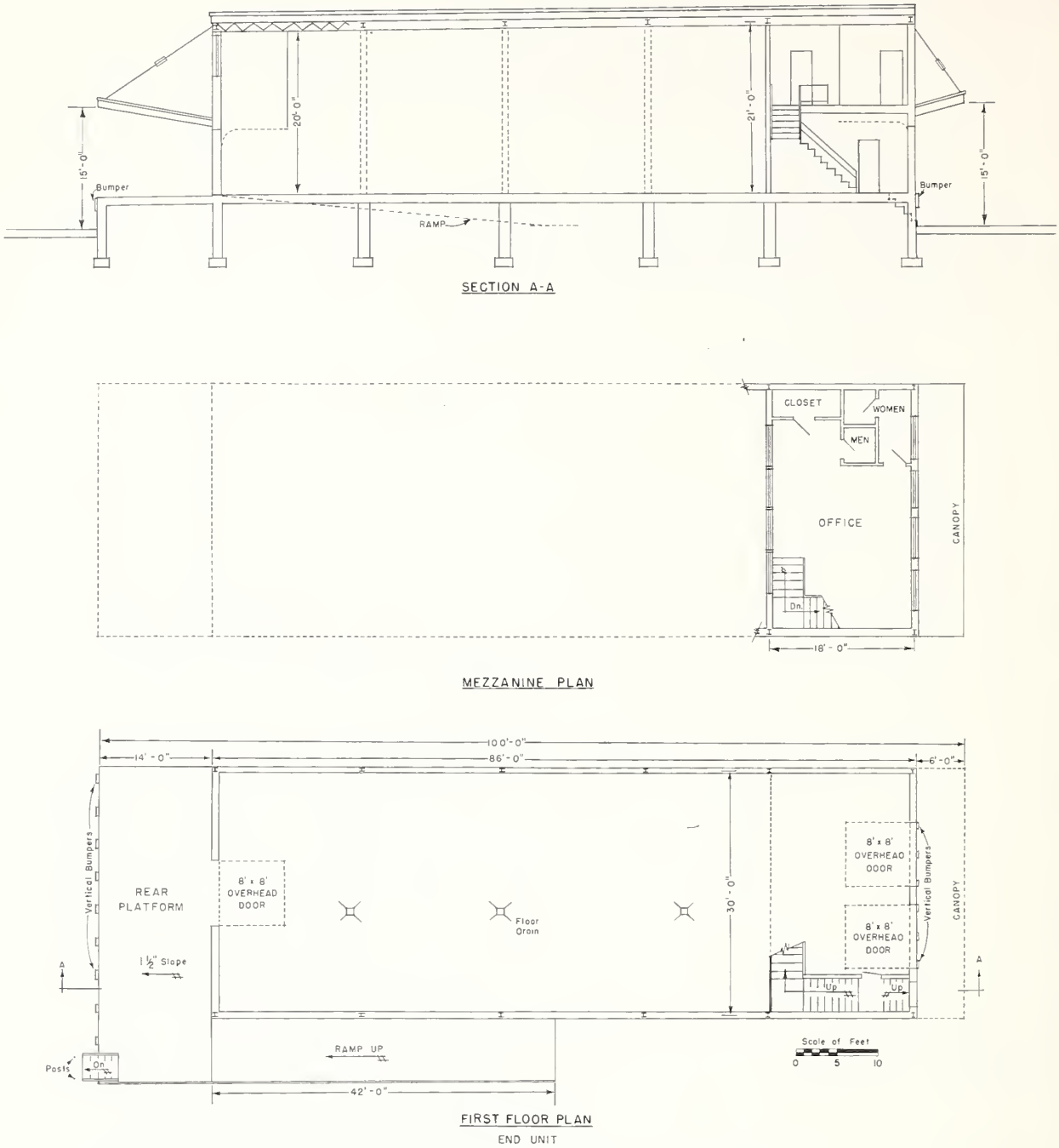

FIGURE 11.--Proposed grocery unit in a multiple-occupancy building.

Doors:

- 2 overhead doors, 8 feet by 8 feet, 45 inches above pavement level, at front of unit, for outgoing shipments
- 1 overhead door, 8 feet by 8 feet, at rear, for incoming shipments
- 1 door, 3 feet wide, at front, to left of overhead doors, for pedestrians

6-foot-deep overhang above large doors

Rubber bumper strips below door openings to protect building and trucks during positioning of trucks

The mezzanine could be used as office or storage space. Products could be held beneath the mezzanine until put into storage or loaded for delivery to the customer.

The single-occupancy building has 48,000 square feet of space. The building should conform to the master plan for the market and meet all building code requirements and health and sanitary regulations. But the firm that will occupy it should decide on the design.

Although another large grocery firm will locate in the proposed center, space requirements and cost estimates are not given here because plans have already been completed and land rentals have been negotiated.

Dairy Products and Eggs

The four dairy products and egg firms would require three units in the meat and related products multiple-occupancy building. These units would be wider than those for meat and related products. Figure 12 shows a proposed unit for these firms. Each unit would be as follows:

Dimensions:

30 feet wide by 72 feet deep; clear stacking height, 20 feet

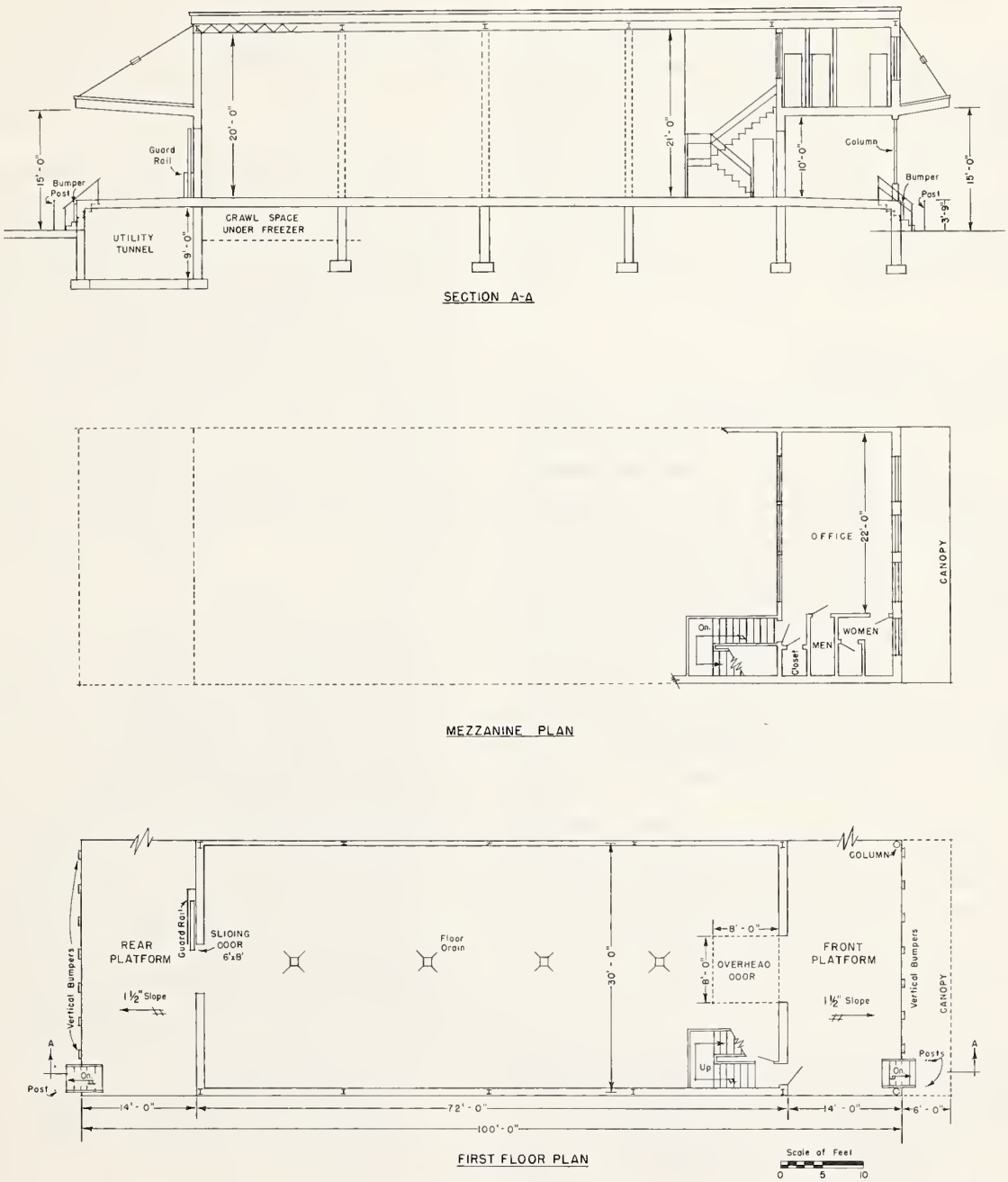

FIGURE 12.--A proposed dairy products and egg unit.

Space (sq. ft.):

Enclosed first floor	2,160
Platforms (front and rear)	840
Mezzanine over front platform	420
Total per unit	3,420

Doors:

- 6-foot-wide power-operated, sliding door, at rear, for unloading directly into cooler or freezer
- 8-foot-wide overhead door at front
- 3-foot-wide doorway to mezzanine stairs, at left of main door

Second floors are not recommended for dairy products and egg firms at this time because of the small volume of the firms requiring space on the new market. Should future growth of the firms warrant it, a second floor or additional mezzanine space may be added for carton storage, office space, welfare rooms, or additional operating space.

The mezzanine may be used for office or storage space.

Platform Requirements

There was a question about the need for platforms. Although platforms are the rule in most facilities of this type on the mainland United States, most food wholesalers and many other businesses in Honolulu operate in warehouses without platforms.[7]

A front platform is needed and can be justified for receiving and loading out conventional trucks. The incidence of containers delivered in the Honolulu market by timber-type straddle trucks indicates a rear platform is also needed. We believe that the units should be designed with conventional truck platforms at the front and rear. A removable platform or truck chassis could be used for containers on straddle trucks.[8]

Platforms should be 14 feet deep and 45 inches above the pavement to permit the use of modern handling methods and equipment for loading and unloading containers and trucks. Platforms should slope to provide adequate drainage. The front platform should have an overhang of at least 6 feet for protection during loading and unloading. There should be no overhang[9] at the rear of the facilities, to permit unloading containers on straddle trucks.

Rubber dock bumpers placed along the edges of the platforms prevent damage to the platforms by trucks or containers being positioned at the docks. These bumpers provide excellent shock-absorbing protection and are easily replaced. Access steps for pedestrians should be set into the platforms where needed.

Streets and Parking Area

All major streets in the proposed market should be wide enough for anticipated as well as present use. They should be paved to carry heavy traffic and designed to promote adequate drainage.

In major markets on the mainland, streets at least 200 feet wide are recommended where buildings face each other and center of the street parking is allowed. However, streets 150 feet wide are recommended for the food center at Fort Armstrong for the following reasons: First, land value makes it imperative that some sacrifice be made to conserve land where the saving will be the least detrimental to the overall operating efficiency of the market. Second, trailer trucks used to transport food products to the market are shorter than those used on the mainland. Third, because the food center will serve a concentrated metropolitan area, relatively small delivery vehicles will continue to be used to distribute food products.

Parking areas should be convenient to the buildings but should not block the streets or loading and unloading areas. They should be clearly designated for trucks and for automobiles. All parking at the building platforms should be at a 90° angle. Employee parking will necessarily be limited, and employees should be encouraged to form carpools or use public transportation. In this manner, parking space can be held to a minimum.

A central parking area has been set aside in the master plan to accommodate cars and trucks using the market. The cost of paving and land rental for this area is not included in cost estimates since we assumed that some government agency or private developer would pay for operating such central parking.

Land that has been set aside for expansion should not be depended upon for park-

[7] USDA compared operating efficiencies in facilities with and without platforms. The research was conducted in facilities for fresh fruits and vegetables, but the findings should be similar for other commodities. See "Operating Characteristics of Buildings With and Without Platforms," in the appendix, for details.

[8] Four arrangements of the receiving area to accommodate containers and trucks are given in "Docking Arrangements for Loading and Unloading," in the appendix.

[9] See "Standards and Controls," par. D, Sec. 7, p. 14, of reference listed in footnote 4, p. 7.

ing although it may be used as such temporarily. Parking areas should be considered as permanent as the buildings. Traffic and parking will not become a problem if streets are the proper width and sufficient parking is provided. Under ideal conditions buildings should not occupy more than 25 percent of the land devoted to the food distribution center.

The number of employees, buyers, and daily loads and unloads in the market indicate that parking space would be needed for approximately 400 cars and trucks. This is in addition to the space at the platforms for loading and unloading.

Expansion Area

Adequate land should be acquired to provide for wholesale food firms not included in the initial planning. In other cities where distribution centers have been constructed, there has been a tendency for food wholesalers and other related industries to locate adjacent to the initial development.

The master plan presented in this report includes 27 acres of potential offshore land plus 11 acres of adjacent land--a total of 38 acres--for expansion.

Additional acreage may be available near the proposed site. This acreage could be designated for future development as the population of the State grows.

Auxiliary Facilities and Considerations

As the market is developed, restaurant facilities may be provided. A good restaurant would attract tourists and downtown businessmen and their families, in addition to serving the needs of market operators and their employees. Private interests may develop more elaborate restaurant facilities adjacent to the market and thus take advantage of an excellent source of high quality foods.

Banking services may also be provided, either by a branch office or complete banking facilities.

A central services building could be built for restaurant and banking facilities and additional offices.

The immediate need for office space can be met in the special-purpose multiple-occupancy building for fresh fruits and vegetables. The small fresh fruit and vegetable wholesalers will not need all the office space in this building. This space may be used by brokers, trucking firms, or related agencies serving the food industry. This office space has been included in cost estimates.

Space is set aside for a refrigerated warehouse. Since no tenant is immediately available, specific space requirements were not determined for a refrigerated warehouse at this time.

Acreage Required and Arrangement of New Facilities

It is extremely important that a master plan be developed and approved at the outset of the project so that the first buildings constructed will not interfere with development of the remaining area. To some extent, building layout has been affected by lease commitments that could not be postponed until a master plan was developed.

The location of access streets also influences building location. The amount of building space required and the width of streets are of vital concern because of the high cost of land in Hawaii. But the space required to conduct operations within a building is no more important than the space needed for supporting functions to serve these facilities.

If the food center is to operate efficiently, the facilities must be arranged so that, in future expansion, they will form an integral and coordinated part of the center. Wholesalers in each food group should be placed together for maximum efficiency in construction and management. And, if at all possible, space for expansion should be provided adjacent to each group.

Approximately 24 acres will be required for the four multiple-occupancy buildings and one single-occupancy building so that marketing functions can be performed efficiently.

Figure 13 shows an arrangement of facilities that would be suitable on the Fort Armstrong site. This arrangement is intended as a guide for firms that may become tenants in the new market.

Fresh fruit and vegetable firms are near the main entry to the market as a convenience to buyers who come to shop the market. This location will reduce traffic moving past other food facilities. The multiple-occupancy buildings for groceries and meat and related products are adjacent to each other. The single-occupancy grocery building is in the same general area as the multiple-occupancy grocery building.

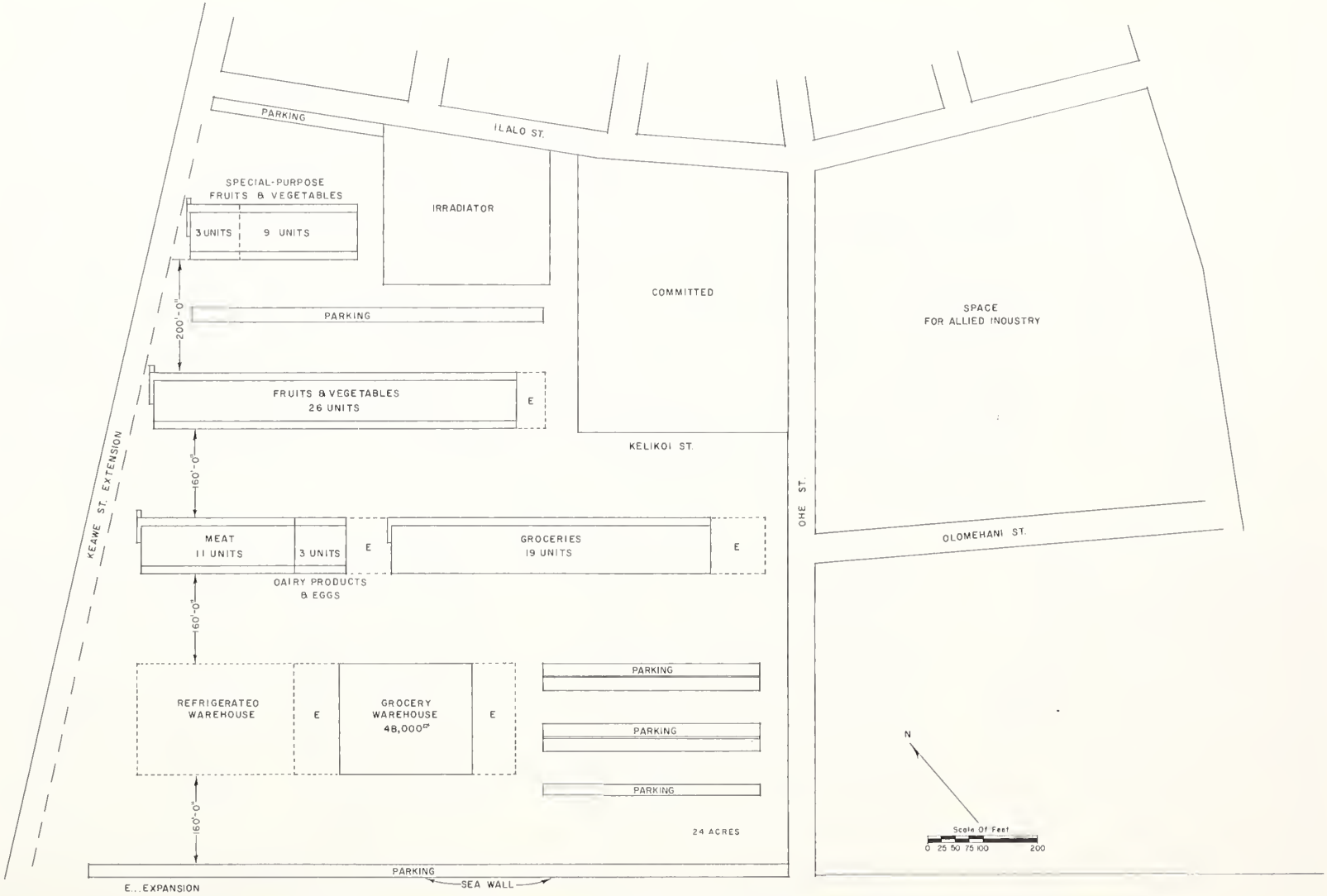

FIGURE 13.--A possible layout of facilities for a wholesale food distribution center on the Fort Armstrong site.

SELECTION OF THE SITE

In Honolulu the most important considerations in the location of a food distribution center were the availability of land and access to port and container facilities and truck transportation.

Five locations were considered as possible sites: (1) Fort Armstrong, (2) Dillingham Pier, (3) Sand Island Industrial Development, (4) Airport Industrial Park, and (5) Mapunapuna Industrial Park (fig. 14).

Earlier studies, conducted by the State, evaluated the potential of these sites for the food distribution center. The Fort Armstrong area, bounded on the north by Ilalo Street, on the south by the seawall, on the east by Ohe Street, and on the west by Keawe Street extension, was chosen as the site.

In this core area, there are about 34 acres. Future requirements might possibly be met by expansion into the area bounded by Ilalo Street, Koula Street, the seawall, and Ohe Street, which would make an additional 11 acres.

According to the Harbors Division of the Department of Transportation, the creation of offshore land would be feasible from an engineering and economic standpoint. About 27 acres might be developed and assigned for future expansion of the food center. This would enlarge the site to approximately 72 acres.

Five principal Government agencies control or occupy buildings at Fort Armstrong: accounting and general services, health, agriculture, transportation, and the city and county of Honolulu. All of these must be relocated before demolition of structures can begin and site preparation completed.

Some of the structures have been removed in preparation for construction. Test borings have been made, engineering studies completed, and plans drawn for the first tenants of the food center at Fort Armstrong.

FIGURE 14.--Locations considered as possible sites for a food distribution center for Honolulu, 1962.

In choosing Fort Armstrong, the principal factors considered, in addition to the availability of land, were as follows: (1) convenience to port and container facilities, (2) convenience to truck transportation, (3) convenience to retail outlets, (4) accessibility of public utilities, (5) avoidance of nonmarket traffic, and (6) land use and zoning.

Convenience to Port Container Facilities

The proposed market is adjacent to the breaking and handling area of the major shipping line and in the immediate vicinity of the port facilities and container complex. Long hauls through the metropolitan area can be avoided. The container complex is the terminus for approximately 80 percent of all food products imported into the State; therefore, the proximity of the food center to the container complex is of prime consideration.

Convenience to Truck Transportation

Highway access to the site is good. Ala Moana Boulevard, a major traffic artery, is north of the site. Completion of limited access highways in and around Honolulu will further enhance this distribution point. The State Highways Division of the Department of Transportation has indicated that current or future traffic patterns will not be seriously affected by the traffic generated at the food center. Buyers may visit the market at Fort Armstrong and select the products required with little delay.

Convenience to Retail Outlets

The Fort Armstrong site is only about 1.1 miles from the population center of the city and county of Honolulu. Since about 72 percent of the direct food receipts was distributed within the Honolulu area, having the food center near the population center should shorten the time required for deliveries to retail outlets or for buyers to come to the market, make their purchases, and return to their stores.

Accessibility of Public Utilities

Public utilities will be established in the Fort Armstrong area as part of preliminary site preparation and development: Food firms that lease land within the area before a master plan is approved will be responsible for establishing their own utility services.[10] But these utilities should be designed so that they can be integrated into the utility plan for the area.

The feasibility of putting electric and telephone lines underground is being considered.

Avoidance of Nonmarket Traffic

Movement of food products through wholesale facilities involves considerable trucking and handling of merchandise. The Fort Armstrong site is in an area free from nonmarket traffic and the site may be fenced to regulate traffic. By locating the food center adjacent to the Diamond Head Terminal complex, travel through city streets can be avoided.

Routing normal traffic in a well-planned food distribution center can be a problem. Since the market will be next to the break-bulk warehouses, care should be taken that traffic of nonfood commodities to or from the warehouses does not impede the operations of the market.

Land Use and Zoning

Land can be assembled and the development controlled more readily at Fort Armstrong than in other areas, because State and county agencies occupy the initial development area.

The State Land Use Commission has classified the Fort Armstrong site "urban," under provisions of Chapter 98H-2 RLH 1955, as amended, and the city and county of Honolulu has zoned the initial phase of the food center development "business." Apparently there is no conflict between these classifications because construction has been completed on the initial phases of the development.

[10] Regulations established by the Department of Land and Natural Resources.

ESTIMATED INVESTMENT COST

The two primary cost components in estimating investment costs are land and facilities.

Land

Because land value in Hawaii is relatively high, many people do not own the land their business or home occupies. The State and a number of large private estates own most of the land, and land rental is more common than land ownership.

The site at Fort Armstrong is entirely State owned, and no firm valuation of the land is available. For purposes of estimating costs, however, it seems reasonable to value the unimproved land at approximately $5 a square foot.[11] State law requires that the real market value at the time of any land transaction be determined by competent appraisal.

At $5 a square foot, cost to the project of leasing the land on the favorable terms proposed by the State would be substantially less than outright purchase of similar lands elsewhere.

The cost of putting the land in condition to build is being borne by the State. Land preparation includes soil surveys, grading, filling and consolidation, holding the land during the filling and consolidation time, and other preparations. The State will also install both sanitary and storm sewers. However, in our estimates each segment of the market has been allocated its share in sewer installation costs.

[11] Jefferson, H. D., Jr. Supplemental Report, Needed: Wholesale Food Center for Hawaii. Dept. Econ. Devlpmt., State of Hawaii. 15 pp. 1962.

Facilities

Cost estimates for the buildings previously described are based on Hawaii construction indices for June 1966, estimates submitted for bid by local contractors in the immediate area, and recent costs of constructing similar facilities.

Multiple-occupancy units do not have finished offices. Estimates include stairways, toilet facilities, lighting fixtures, electrical outlets, platform lights, and protective rubber bumper strips for the platforms. No provision is made for refrigeration except in the special-purpose building for fresh fruits and vegetables.

All roofs would be insulated, and all buildings would be provided with rodent control protection. Each multiple-occupancy building would have a ramp at one end. Detailed costs for the buildings are for "light mill" type of construction of the basic structure. Estimated cost of paved surfaces for each food group includes the group's allocated share of streets within the center. Floodlights are charged to the user. Space proposed for the initial facilities depends upon both present and future needs.

The costs cited are intended as guides and should not be substituted for firm proposals by contractors or architects.

The investment cost was used in estimating the cost of debt service, taxes, and insurance found later in the report. The following tabulations show the estimated cost of buildings, architect fee, construction loan, and contingency fund for each food group.

1. Multiple-occupancy facility, general use:	
A. Building:	
26 units, including mezzanines and a utility tunnel under rear platform--2,500 sq. ft. at platform level @ $9.50 per sq. ft., 350 sq. ft. of mezzanine @ $2.50 per sq. ft., 350 sq. ft. under rear platform @ $2.50 per sq. ft., or $25,500 per unit	$663,000
Ramp	1,316
Rodent control	17,581
Cost of building	681,897
B. Other facilities:	
Paving (blacktop combination)--23,183 sq. yd. @ $5 per sq. yd.	115,915
Sewers:	
1,119 ft.--30-in. (storm) @$8.50 per linear ft.	9,511
694 ft.--12-in. (sanitary) @ $3 per linear ft.	2,082
Floodlights--10 @ $200 each	2,000
Fencing (8-ft.)--1,360 ft. @$3.50 per linear ft.	4,760
Public address system	450
Cost of building and other facilities	816,615
C. Associated construction costs:	
Architect's fee	48,997
Construction loan	43,281
Contingency allowance	90,889
Total, building, other facilities, and associated costs	999,782
2. Multiple-occupancy facility, special purpose:	
A. Building:	
12 units, including mezzanines and a utility tunnel under rear platform--2,500 sq. ft. at platform level @$9.50 per sq. ft., 350 sq. ft. of mezzanine @$2.50 per sq. ft., 350 sq. ft. under rear platform @ $2.50 per sq. ft., or $25,500 per unit	306,000
Common cooler area	75,500
Ramp	1,316
Rodent control	5,585
Cost of building	388,401
B. Other facilities:	
Paving (blacktop combination)--10,791 sq. yd. @ $5 per sq. yd.	53,955
Sewers:	
521 ft.--30-in. (storm) @ $8.50 per linear ft.	4,429
323 ft.--12-in. (sanitary) @ $3 per linear ft.	969
Floodlights--5 @$200 each	1,000
Fencing (8-ft.)--633 ft. @ $3.50 per linear ft.	2,216
Cost of building and other facilities	450,970
C. Associated construction costs:	
Architect's fee	27,058
Construction loan	23,901
Contingency allowance	50,193
Total, building, other facilities, and associated costs	552,122
Total cost, fresh fruits and vegetables	1,551,904

Meat and Related Products

1. Multiple-occupancy facility: [1]	
A. Building:	
11 units, including mezzanines and utility tunnel under rear platform--2,500 sq. ft. at platform level @ $9.50 per sq. ft., 350 sq. ft. of mezzanine @ $2.50 per sq. ft., 350 sq. ft. under rear platform @ $2.50 per sq. ft., or $25,500 per unit	$280,500
Ramp[2]	992
Rodent control	6,942
Cost of building	288,434
B. Other facilities:	
Paving (blacktop combination)--9,683 sq. yd. @ $5 per sq. yd.	49,315
Sewers:	
476 ft.--30-in. (storm) @ $8.50 per linear ft.	4,046
295 ft.--12-in. (sanitary) @ $3 per linear ft.	885
Floodlights--4 @ $200 each	800
Fencing (8-ft.)--578 ft. @ $3.50 per linear ft.	2,023
Cost of building and other facilities	345,503
C. Associated construction costs:	
Architect's fee	20,730
Construction loan	18,312
Contingency allowance	38,455
Total costs, meat and related products	423,000

Groceries

1. Multiple-occupancy facility:	
A. Building:	
19 units, including mezzanines--3,000 sq. ft. at platform level @ $9.50 per sq. ft., 540 sq. ft. of mezzanine @ $2.50 per sq. ft., or $29,850 per unit	567,150
Ramp	1,316
Rodent control	16,338
Cost of building	584,804
B. Other facilities:	
Paving (blacktop combination)--20,317 sq. yd. @ $5 per sq. yd.	101,585
Sewers:	
981 ft.--30-in. (storm) @ $8.50 per linear ft.	8,339
609 ft.--12-in. (sanitary) @ $3 per linear ft.	1,827
Floodlights--9 @ $200 each	1,800
Fencing (8-ft.)--1,192 ft. @ $3.50 per linear ft.	4,172
Cost of building and other facilities	702,527
C. Associated construction cost:	
Architect's fee	42,152
Construction loan	37,234
Contingency allowance	78,191
Total, building, other facilities, and associated cost	860,104

See footnotes at end of tabulation, page 34.

2. Single-occupancy facility:	
A. Building:	
48,000 sq. ft. @ $9.50 per sq. ft.	$456,000
Rodent control	10,296
Cost of building	466,296
B. Other facilities:	
Paving (blacktop combination)--16,945 sq. yd. @ $5 per sq. yd.	84,725
Sewers:	
818 ft.--30-in. (storm) @ $8.50 per linear ft.	6,953
508 ft.--12-in. (sanitary) @ $3 per linear ft.	1,524
Floodlights--8 @ $200 each	1,600
Fencing (8-ft.)--994 ft. @ $3.50 per linear ft.	3,479
Cost of building and other facilities	564,577
C. Associated construction cost:	
Architect's fee	33,875
Construction loan	29,923
Contingency allowance	62,838
Total, building, other facilities, and associated costs	691,213
Total cost, groceries	1,551,317

Dairy Products and Eggs

1. Multiple-occupancy facility:	
A. Building:	
3 units, including mezzanines and a utility tunnel under rear platform in same building as meat firms--3,000 sq. ft. at platform level @ $9.50 per sq. ft.; 420 sq. ft. of mezzanine @ $2.50 per sq. ft.; 420 sq. ft. under rear platform @ $2.50 per sq. ft., or $30,600 per unit	91,800
Ramp[2]	324
Rodent control	2,855
Cost of building	94,979
B. Other facilities:	
Paving (blacktop combination)--3,204 sq. yd. @ $5 per sq. yd.	16,020
Sewers:	
155 ft.--30-in. (storm) @ $8.50 linear ft.	1,317
96 ft.--12-in. (sanitary) @ $3 per linear ft.	288
Floodlights--2 @ $200 each	400
Fencing (8-ft.)--188 ft. @ $3.50 per linear ft.	658
Cost of building and other facilities	113,662
C. Associated construction cost:	
Architect's fee	6,820
Construction loan	6,024
Contingency allowance	12,651
Total, building, other facilities, and associated costs	139,157
Grand total	3,665,378

[1] A USDA contractor's report evaluating the merits of central vs. individual refrigeration systems is now under study. For this reason, detailed cost estimates are not included here.

[2] Ramp cost is prorated between meat and related products firms and dairy products and egg firms according to the percentage of total building space they occupy.

Type of ownership will determine to a large degree the way a new food distribution center for Honolulu is financed. There are several possibilities: (1) Private corporation, (2) public benefit corporation, (3) direct public ownership, or (4) a combination.[12]

The cost of financing and operating a food center would depend partly on the methods used to finance the development. City or State ownership not only could reduce interest costs, but could materially affect the amortization period. If a corporation with substantial assets were constructing its own facilities, it obviously could expect better financing arrangements than one with limited assets. Certain assumptions have been made in this report because illustrating all the possibilities was not feasible.

In estimating financing and operating costs, we assumed that a single developer or agency would construct all facilities and lease them to the prospective occupants. These assumptions are NOT intended to suggest the most desirable arrangement, nor are they intended to exclude other arrangements. They are presented in this report so that some estimate of probable operating expenses could be included.

For purposes of this report, financing and operating costs will be considered under four categories: (1) Management and upkeep, (2) taxes on real estate, (3) land rental, and (4) debt service.

Private Corporation

A private corporation usually is organized for profit, but it can be operated as a nonprofit organization. The incorporators usually obtain a charter from the State. This charter defines the powers of the corporation and of its officers and directors. It also specifies what the stockholders' rights shall be and how they shall exercise control.

When a private corporation is operated for profit, there are usually no restrictions on the sale of voting stock to any individual because of his occupation or profession or on the number of shares of voting stock any one individual may hold. Stockholders normally have one vote in corporate affairs for each share of voting stock they hold.

A major advantage of a private corporation is the ability of the board of directors to make decisions quickly and without the delay found in other types of organizations. Quick decisions on major policies sometimes make the difference between success and failure of an organization. In addition, when the period of amortization expires, the entire investment belongs to the stockholders; tenancy changes have no effect upon stock ownership; and transfer of stock is unrestricted. The major problem in financing a privately owned project is that a substantial equity is necessary.

When a private corporation is operated on a nonprofit basis, the sale of shares of voting stock usually is restricted. A nonprofit market corporation probably would restrict the sale of stock to farmers, truckers, wholesalers, and others directly concerned with the operation of the market and would base the amount of stock sold to one individual or firm on the amount of facilities used. Some corporations require eligible purchasers of voting stock to buy a specified number of shares of nonvoting stock. Through these restrictions on stock sales, the number of stockholders' votes and the voice in management exercised by any one shareholder are limited. Under the laws in some States, nonprofit corporations are referred to as cooperative corporations or societies.

Many wholesale markets are owned and operated by private corporations. In some of these corporations, the principal stockholders are food wholesalers. In others, the corporation may be a railroad company or some other company primarily organized for another type of business.

Management and Upkeep

Cost of managing the proposed food distribution center includes salaries for the manager and secretary-clerk, auditing and legal service, office rental, advertising and promotion, office supplies and equipment, travel and business expenses, communications, and utilities. Total management cost is estimated to be $37,900 per year.

Cost of upkeep consists of insurance and maintenance expenses. Fire and extended coverage insurance was based on rates that would probably apply to the structures planned. Fire and extended coverage would

[12] For a more detailed discussion of these methods, see: Clowes, H. G., Elliott, W. H., and Crow, W. C. Wholesale Food Marketing Facilities, Types of Ownership and Methods of Financing. U.S. Dept. Agr. Market. Res. Rpt. 160, 96 pp., illus. 1957.

be $6,900 per year, based on a rate of $2.74 per $1,000 valuation for 100 percent of the building cost. Liability insurance covering all liabilities of the food center to the limit of $300,000 per accident would cost $3,500 annually, at the rate of $3.29 per 1,000 square feet. General maintenance cost was assumed to be 0.75 percent of the total construction cost of buildings and other facilities, which would be about $22,700 per year. Watchmen, a refrigeration attendant, and market sanitation would cost $26,600 annually.

A reserve or contingency fund of 10 percent of the amount required for management and upkeep was included to allow for variations. The fund would be $9,800 per year. The annual cost for management and upkeep for the proposed food distribution center were estimated as follows:

Management:[1]	
Manager	$15,000
Secretary-clerk	5,800
Auditing and legal services	3,500
Office rental	2,400
Advertising and promotion	2,000
Office supplies and equipment	1,200
Travel and business expenses	1,000
Communications	1,000
Utilities	6,000
Maintenance:	
Insurance: Liability, fire, and extended coverage	10,406
Watchmen (4)	18,000
Refrigeration attendant	4,600
Market sanitation	4,000
General maintenance[2]	22,668
Contingency	9,757
Total cost	107,331

[1] Management expenses will depend upon the services desired by tenants.

[2] General maintenance, based on 0.75 percent of total construction cost.

Real Estate Taxes

If a private organization constructed and operated the proposed facilities, it would pay real estate taxes. There would be no real estate taxes, as such, if the facilities were developed by a government agency. But it is desirable to include a "tax payment" in the cost estimates to make them more realistic. The tax would be based on a 70-percent assessed valuation of buildings and other taxable facilities. The assessed valuation on the proposed facilities would be $2,565,800. For this report, $19.63 per $1,000 of assessed valuation was used. Since it is possible that tax rates and assessed valuation may increase, a reserve of 10 percent has been included. This reserve could probably be discontinued when it amounts to a full year's tax payment. The annual tax payment would be $50,400 and the reserve would be $5,000.

Land Rental

In this report it is assumed that the State will retain ownership of the Fort Armstrong property and will rent to the developer of the proposed food center. The estimated value of the land at the Fort Armstrong site is $5 per square foot, or $217,800 per acre.[13] The estimated rental per acre would be $11,761 per year. Buildings and their associated areas for parking, streets, and expansion would require 24.2 acres of land and a rental payment of $284,616 per year. The rental payment for land to be used by allied industry would have to be borne by the developer until the land was rented by tenants.

Debt Service

A major cost that must be borne by a food distribution center is debt service. The proportion of the total construction and associated cost that might be borrowed and the terms of the loan depend upon the availability of money and interest rates at the time. Facilities of the type described should not be obsolete in less than 20 to 30 years and could be useful for longer periods. These facilities were designed so that with minor alterations they could be converted for other types of business or for light industry.

A privately owned corporation holding title to the land would ordinarily finance the center with first and possibly second mortgage bonds and equity capital. As much as 65 percent of the required investment might be secured under a first mortgage bond issue, 20 to 25 percent under a subordinated indenture, and 10 to 15 percent through sale of stock, primarily to prospective tenants.

A problem and an opportunity confront the developer of the proposed food center for Honolulu and may produce a financing plan quite different from the conventional capital structure. The problem is that title

[13] See reference in footnote 11, p. 31.

to the land will be retained by the State. Consequently, the food center will have only its leasehold interest in the land and improvements to offer as mortgage security. The opportunity is the prospect of pooling private capital with public loan funds by reason of (1) the eligibility of the food wholesalers for financial help from the Small Business Administration, and (2) the probable availability of some help from the Hawaii Capital Loan Program.

At this stage, it is not possible to predict either the proportion or the terms of the financing that will be secured for the project from respective potential sources. Certain working assumptions are essential to this study, however, to determine annual debt service requirements to make other fiscal projections and to develop the all-important basic rental figure upon which economic feasibility will be predicated. Accordingly, to simplify the problem, we have assumed that the project will be financed through a senior bond issue furnishing 65 percent of the total capital investment, a subordinate issue providing 25 percent of the funds required, and equity capital in the amount of 10 percent. We have also assumed that project indebtedness will be amortized over a 25-year period at interest rates of 5 1/2 and 6 1/2 percent for the respective obligations.

Should present money market conditions not be relieved at the time of construction, interest charges will probably be higher than those mentioned previously.

To market bonds successfully, or to otherwise assure prospective creditors, the developer should establish a debt service reserve. For this reserve, he should set aside each year an amount equivalent to 20 percent of aggregate annual amortization charges. At the end of 5 years, with the debt service reserve then holding amortization needs for 1 full year, further accumulations for this purpose may be discontinued. To insure stock subscription, it may also be necessary for the prospectus to promise a return, such as 7 percent, on the equity capital. Conservative allowance for all of the foregoing needs requires a weighted average rate of approximately 6 percent to service indebtedness and to provide the suggested yield on equity holdings. Over the 25-year period of amortization, annual payments would amount to $78.23 per $1,000 of total capital investment.

If bonds were issued, purchasers might demand that current income exceed expenses by some stipulated amount and that this remain as a reserve fund. The amount would vary according to the situation of the money market, the financial rating of the bond issuer, and the value of collateral. We assumed an amortization charge of 6 percent annual interest for 25 years, or $78.23 per $1,000. The estimated annual income required for debt service for the facilities recommended is $286,700. The reserve fund should amount to 20 percent of debt service, $57,300, or a total of $344,090.

Total Annual Revenue Required

The revenue required by a private developer to finance and operate the proposed food center is estimated at $791,400 per year. Costs of management and upkeep, taxes, debt service, and land rental are prorated among the different food groups in table 12.

TABLE 12.--Estimated total revenue required by a private developer for operating the proposed food distribution center in Honolulu, by kind of expense and type of wholesaler

Type of wholesaler	Management and upkeep	Real estate taxes and reserve	Debt service and reserve	Land rental[1]	Total
	Dollars	Dollars	Dollars	Dollars	Dollars
Fresh fruits and vegetables:					
Firms in multiple-occupancy building (general use)	28,979	15,112	93,856	76,846	214,793
Firms in multiple-occupancy building (special use)	15,992	8,345	51,830	42,408	118,575
Meat and related products	12,236	6,394	39,709	32,446	90,785
Groceries:					
Firms in multiple-occupancy building	25,974	13,001	80,743	68,877	188,595
Firms in single-occupancy building	20,071	10,448	64,889	53,223	148,631
Dairy products and eggs	4,079	2,103	13,063	10,816	30,061
Total	107,331	55,403	344,090	284,616	791,440

[1] Land rentals are based on the following acreages: Fresh fruits and vegetables, 6.5 acres for general use and 3.6 acres for special use; meat and related products, 2.8 acres; groceries, 5.9 acres for multiple-occupancy building and 4.5 acres for single-occupancy building; dairy products and eggs, 0.9 acre.

Management and upkeep costs for the entire project have been prorated to the various groups of lessees on the basis of the value of their facilities. Costs of operating the individual businesses are not included.

Public Benefit Corporations

Public authorities created by State or local governments to construct and operate market facilities are usually organized as public benefit corporations.

A public benefit corporation is a nonprofit agency. As such, rentals and other charges do not exceed the amount needed to pay the costs of operation, amortize the original investment, and maintain a limited reserve for contingencies. Since under public ownership the revenues would be considered public funds, the reserve fund could not be paid to lessees as dividends. However, reserve funds might possibly be appropriated for other public uses while bonds remained outstanding, unless reserves are specifically committed to redemption of bonds.

Public benefit corporations usually have the power of eminent domain, which can be useful in the acquisition of a site. Such corporations usually finance market improvements through sale of revenue bonds. This type of financing normally is not a full obligation of a State or a political subdivision. Since these revenue bonds are often tax exempt, the interest cost is lower. A public agency, such as a market authority, is more likely than private ownership to provide for future expansion and to work toward a complete wholesale food distribution center. A market authority may or may not be required to pay taxes to the community in which it is located.

Market authorities also have certain limitations, especially in the financing and management of the facilities. They may find it difficult to raise funds through revenue bonds unless enough equity funds are provided in some way, or the bonds are guaranteed by the city, county, or State. Some State or city governments have appropriated part of the funds needed for land acquisition and original construction. The continuity of management may depend on the continuance of a State or municipal government administration in office. As a whole, market authorities do not have as complete freedom of operation as private ownership.

If the food distribution facilities were financed by a municipal or State authority, certain cost advantages could be obtained. For this report, methods of financing by the City of Honolulu and the State of Hawaii would be similar, and further reference will be to public financing.

Management and Upkeep

Costs of management and upkeep will be about the same whether the market is financed and operated by a private corporation or a public agency. The same responsibility exists in both cases. Costs of management and upkeep, including the costs of insurance, maintenance, and repairs, are estimated at $107,331 annually.

Real Estate Taxes

Since all Hawaii would benefit from an efficient food distribution center, payment in lieu of taxes would probably be made to the taxing authority by the public agency financing the center. The proposed rate is based on a flat assessment of buildings (improvements only) at the same rate a private corporation would pay, because there is no way of predicting the action that future State legislatures might take. These rates would yield an annual payment of $50,400 plus a reserve of $5,000, or about $55,400.

Land Rental

Assuming outright public ownership of the market, it would be necessary to charge land rental or a rental equivalent. Land rental will be about the same whether the market is financed and operated by a private corporation or a public agency.

Debt Service

Public financing and operation of the proposed facilities could mean additional savings over private financing. A saving in debt service costs could be realized by public financing and operation because a lower interest rate could be obtained. The exact terms of financing will depend upon the money market, credit ratings of the bonds, and credit standing of the agency involved. It is impossible to determine the

exact rate that would be required to obtain the necessary funds, especially with the tightness of the money market in 1967. However, it is reasonable to assume a rate of approximately 4 percent annually, considering construction is not planned immediately and the long-term rate should settle around 4 percent, according to bonding agencies. The 4 percent interest rate for 25 years would mean an amortization charge of $64.01 per $1,000. The estimated annual income required for debt service for the facilities would be $234,600. The reserve fund should be 20 percent of debt service, $46,900, or a total of about $281,545.

Total Annual Revenue Required

The revenue required for a public agency to finance and operate the proposed food center at Fort Armstrong is less than for a private corporation. Costs of management and upkeep, insurance, maintenance and repairs, taxes, debt service, and land rental, are estimated at $728,895 per year for public financing. These costs are prorated among the different food groups in table 13.

Management and upkeep costs for the entire project have been allocated to the various food groups on the basis of the value of their facilities. The costs of operating the individual businesses are not included.

Direct Public Ownership

Some wholesale food market facilities have been financed, constructed, and operated by States, counties, or municipalities. Several States and municipalities have enabling legislation covering the improvement or establishment of produce markets.

Direct State ownership and operation usually differs from ownership and operation by a State market authority in methods of financing and in authority delegated by the State legislature. Although a number of States have appropriated funds and otherwise assisted market authorities with financial problems, they do not usually underwrite the total cost of a market constructed by an authority, nor have the States always assumed responsibility for the operation of these markets. Direct State ownership depends on the market facility's being financed wholly or partly by an appropriation of State funds. If the financing is not entirely by appropriation of funds, the State usually is obligated to supply the remainder by some other means unless this balance is obtained through grants or donations. Also, the State is responsible for maintenance and other expenses involved in the operation of a State-owned market.

Municipal ownership of a wholesale food market is comparable in many of its basic aspects to direct State ownership. Some municipalities are authorized in their charters to construct and operate food markets. Three methods are usually open to municipalities for financing a market program: (1) Issuance of municipal bonds, (2) issuance of revenue warrants, and (3) loans from public corporations. In most cities the issuance of bonds for such purposes must be approved by a majority of

TABLE 13.--Estimated total revenue required by a governmental agency for operating the proposed food distribution center in Honolulu by kind of expense and type of wholesaler

Type of wholesaler and building	Management and upkeep	Real estate taxes and reserve	Debt service and reserve	Land rental[1]	Total
	Dollars	Dollars	Dollars	Dollars	Dollars
Fresh fruits and vegetables:					
Multiple-occupancy	28,979	15,112	76,795	76,846	197,732
Special purpose	15,992	8,345	42,409	42,408	109,154
Meat and related products, multiple-occupancy	12,236	6,394	32,493	32,446	83,569
Groceries:					
Multiple-occupancy	25,974	13,001	66,066	68,877	173,918
Single-occupancy	20,071	10,448	53,094	53,223	136,836
Dairy products and eggs, multiple-occupancy	4,079	2,103	10,688	10,816	27,686
Total	107,331	55,403	281,545	284,616	728,895

[1] Land rentals are based on the following acreages: Fresh fruits and vegetables, 6.5 acres for general use and 3.6 acres for special use; meat and related products, 2.8 acres; groceries, 5.9 acres for multiple-occupancy building and 4.5 acres for single-occupancy building; and dairy products and eggs, 0.9 acre.

the qualified electorate voting in a referendum.

States may finance, construct, and operate wholesale food market facilities because legislative bodies feel that improved facilities, in themselves, will serve the public interest. Facilities constructed with municipal or county funds would necessarily be owned by the county or municipality.

Combinations

Wholesale food distribution centers have been established by combining two or more of the types of ownership and operation previously described. For example, in Philadelphia a food distribution center has been developed by a nonprofit corporation on land owned and put in condition for building by the city.

SOURCE OF REVENUE

We have assumed that revenue will be derived from facility rentals. These rentals could be materially affected by financing and operating methods. We computed revenue requirements for both private and public financing and operation.

Rental charges could be the same for all tenants or could vary according to commodity group. Rentals given are based on total square feet of space. A common rental per square foot per year would be $2.98 for private financing and operation and $2.75 for financing and operation by a governmental agency. If rentals were varied according to commodity group, they would range from $2.80 to $3.47 per square foot for private financing and operation and $2.59 to $3.19 for public financing and operation (table 14).

Variations in rentals for similar facilities are due to differences in land required, paving necessary, building costs, and other minor differences. The rentals given would be sufficient to cover costs and reserves.

TABLE 14.--Estimated annual rental needed by private and public agencies for financing and operating the proposed food distribution center, Honolulu

Type of wholesaler and building	Space proposed	Private financing		Public financing	
		Rate per sq. ft.	Rental	Rate per sq. ft.	Rental
	Square feet	Dollars	Dollars	Dollars	Dollars
Fresh fruits and vegetables:					
Multiple-occupancy	74,100	2.90	214,793	2.67	197,732
Special purpose	34,200	3.47	118,575	3.19	109,154
Meat and related products, multiple-occupancy	31,350	2.90	90,785	2.67	83,569
Groceries:					
Multiple-occupancy	67,260	2.80	188,595	2.59	173,918
Single-occupancy	48,000	3.10	148,631	2.85	136,836
Dairy products and eggs, multiple-occupancy	10,260	2.93	30,061	2.70	27,686
Total or average	265,170	2.98	791,440	2.75	728,895

ESTIMATED COST REDUCTIONS AND BENEFITS

Moving Commodities to Wholesalers' Facilities

Location of the proposed food center adjacent to the pier 2 container yard would eliminate the fee required to move containers over Honolulu streets to wholesalers' facilities. Cartage fees should be much lower than those for moving products from the break-bulk station at pier 2 to the present markets.

The design of the proposed food center, with wide streets and ample parking, should eliminate a considerable expense caused by avoidable delay.

In the proposed facilities, savings to wholesalers are estimated at $160,504 annually for this phase of operations (table 15 and appendix table 21).

TABLE 15.--Estimated annual cost of moving food products to present facilities of 71 independent wholesalers, 1964, and to proposed facilities, Honolulu[1]

Type of wholesaler	Total costs		Cost reduction
	Present	Proposed	
	Dollars	Dollars	Dollars
Fresh fruits and vegetables....	178,028	111,674	66,354
Meat and related products.....	105,777	53,372	52,405
Groceries.....	71,888	34,262	37,626
Dairy products and eggs.....	4,959	840	4,119
Total.....	360,652	200,148	160,504

[1] See appendix table 20.

TABLE 16.--Estimated annual cost of labor and equipment used in present facilities of 71 independent wholesalers, 1964, and in proposed facilities, Honolulu[1]

Type of wholesaler	Total costs		Cost reduction
	Present	Proposed	
	Dollars	Dollars	Dollars
Fresh fruits and vegetables....	486,867	295,252	191,615
Meat and related products.....	803,134	410,112	393,022
Groceries.....	341,911	191,724	150,187
Dairy products and eggs.....	24,511	9,109	15,402
Total.....	1,656,423	906,197	750,226

[1] See appendix table 21.

Handling Within the Proposed Center

Cost of handling within the proposed center includes costs for labor and equipment and rentals for proposed facilities. Complete cost estimates for refrigeration are not included in this report; therefore, savings that would accrue as a result of adequate refrigeration are not included in total savings. (See footnote 3, table 20.)

Savings in labor and equipment within the market areas would result from decreasing the cost of unloading trucks and containers at facilities, handling the products within the facilities, loading outbound trucks, and transferring products between firms.

Considerable savings could be achieved by increased efficiency in the improved facilities. The one-story buildings would have both front and rear platforms, except the grocery facilities which would have only rear platforms. Products could be transported by modern equipment between coolers, storage, or display areas and could be selected and efficiently loaded for transport out of the facility. Even firms handling small volumes could realize savings by using pallet jacks, pallets, and other equipment to improve operating efficiency in recommended facilities.

We have assumed that most products in the proposed facilities would be handled through the firms' stores and that the amount of interchange between firms would not be greatly affected. Because of their concentration, firms in the proposed food center could reduce the cost of interdealer handling. Firms in a multiple-occupancy building could exchange products by moving them along a common platform.

The reduction in the cost of labor and equipment within the market areas is estimated at $750,226 annually. (See table 16 and appendix table 21.)

All wholesalers should expect a substantial increase in rents. Wholesalers requiring refrigerated facilities will have costs in addition to those shown here. The proposed facilities would offer many improvements and services not now available to wholesalers in Honolulu.

Rentals in new facilities would be about $320,000 higher under private financing and about $257,000 higher under public financing than rentals now paid by the food wholesalers expected to move to the proposed food center (table 17).

Some firms that cannot have refrigeration now could reduce spoilage losses by installing adequate refrigeration. With less handling required, pilferage and breakage, bruising, and subsequent spoilage could be reduced. Wholesalers could save approximately $183,000 annually by reducing spoilage losses (table 18 and appendix table 21). Cost reduction estimates are based on the experience of firms operating in modern facilities.

Distribution From the Proposed Center

Distribution costs in the proposed facilities are estimated to be the same as those in the present facilities because the delivery distance would be similar. For further details, see appendix table 21. Distribution costs would be as follows:

Fresh fruits and vegetables	$290,702
Meat and related products	187,334
Groceries	128,832
Dairy products and eggs	16,925
Total	623,793

Summary of Benefits and Savings

We estimated that 114,139 tons of food products would be marketed through improved facilities by wholesalers expected to relocate. Costs of getting these products from the first point of arrival to the wholesalers' present facilities were estimated at $360,652, or an average of $3.16 per ton.

TABLE 17.--Estimated annual rent of 71 independent wholesalers in present facilities, 1964, and in proposed facilities, Honolulu[1]

Type of wholesaler	Present cost[1]	Proposed cost		Savings or increases[3]	
		Private financing[1]	Public financing[2]	Private financing[1]	Public financing[2]
	Dollars	Dollars	Dollars	Dollars	Dollars
Fresh fruits and vegetables	181,622	333,368	306,886	-151,746	-125,264
Meat and related products	147,540	90,785	83,569	+56,755	+63,971
Groceries	124,660	337,226	310,754	-212,566	-186,094
Dairy products and eggs	17,910	30,061	27,686	-12,151	-9,776
Total	471,732	791,440	728,895	-319,708	-257,163

[1] See appendix table 21.
[2] See table 14.
[3] Minus sign denotes increase in cost.

TABLE 18.--Estimated spoilage, deterioration, breakage, and shrinkage of 71 independent wholesalers in present facilities, 1964, and in proposed facilities, Honolulu[1]

Type of wholesaler	Total costs		Cost reduction
	Present	Proposed	
	Dollars	Dollars	Dollars
Fresh fruits and vegetables	172,184	84,517	87,667
Meat and related products	124,363	63,698	60,665
Groceries	68,315	34,309	34,006
Dairy products and eggs	1,459	801	658
Total	366,321	183,325	182,996

[1] These estimates are based on studies by the University of Hawaii and previous research by the U.S. Department of Agriculture. Complete cost estimates for refrigeration are not included because basic requirements differ substantially among dealers.

The average cost per ton could be reduced to $1.83 in the proposed facilities, or a total cost of $200,148. Total savings in getting the products to the markets are estimated at $160,504 annually. These cost reductions result from fewer and shorter trips from docks to the wholesale facility.

Benefits and savings possible from improved facilities are greater in handling products within the market. Here the average cost per ton could be reduced from $18.65 per ton to $14.87 per ton, a saving of $430,518.

Total annual savings, excluding those that would accrue from adequate refrigeration, are estimated at $591,022, if private financing is used and $653, 567 if public financing is used. (See table 19 and appendix table 21.)

Nonmeasurable Savings

Many benefits of a food distribution center cannot be measured in dollars. Wholesalers, wholesale buyers, consumers, market employees, agricultural producers, transportation firms, and government agencies share these economic and social benefits.

With many Honolulu food firms located in a food distribution center, the advantage of more unified action is possible. Construction costs would be reduced. Operating hours could be regulated by tenants or an authority. Reduced handling could result in higher quality products.

Market employees should have improved working conditions in the proposed facilities. The facilities permit the use of handling equipment that makes the workers' jobs less strenuous. The location of the market facilities in one area should improve the general environment and lead to more regular working hours.

Grouping dealers by commodities in multiple-occupancy buildings, with adequate streets and parking, should enable buyers to shop various commodity groups with less time and effort. This saving would permit a buyer to perform other tasks in his business that would benefit not only himself but also his customers.

Transportation firms should find the central location conducive to better management of their operations. Delays caused by traffic congestion in markets and inadequate parking would be eliminated.

Relocation of many food wholesalers would permit using the areas they now occupy for retail outlets, service firms, or residential or other purposes. There should be better control of traffic and easier enforcement of sanitary, health, and fire regulations.

Consumers in Honolulu could expect better food, and some of the savings might be passed on in lower food prices.

TABLE 19.--Estimated annual costs and savings of 71 independent wholesalers in present facilities, 1964, and in proposed facilities, Honolulu[1]

Type of wholesaler	Present cost	Proposed cost		Savings or increases[2]	
		Private financing	Public financing	Private financing	Public financing
	Dollars	Dollars	Dollars	Dollars	Dollars
Fresh fruits and vegetables	1,137,219	1,030,996	1,004,514	106,223	132,705
Meat and related products	1,243,785	741,603	734,387	502,182	509,398
Groceries	667,291	692,044	665,572	-24,753	1,719
Dairy products and eggs	64,305	56,935	54,560	7,370	9,745
Total	3,112,600	2,521,578	2,459,033	591,022	653,567

[1] Complete cost estimates for refrigeration are not included in this report because basic requirements differ substantially among dealers. Savings that would accrue from adequate refrigeration cannot, therefore, be included in total savings.
[2] Minus sign (-) denotes increase.

APPENDIX

Determining Volume, Flow Patterns, and Marketing Costs for Present and Proposed Facilities

Information pertaining to volume of receipts of commodities, flow of commodities through the market areas, and costs of receiving, handling, and distributing products were obtained by interviews with the food dealers, State and city officials, personnel of the University of Hawaii, personnel of steamship companies, and others with knowledge of the food industry in Honolulu and Hawaii.

Information was gathered on costs from a sampling of food wholesalers. In many instances, the data were incomplete because the wholesalers' records were incomplete, individual dealers were reluctant to divulge their data, or a combination of these reasons. Where possible, the data were cross-checked with information from public agencies and transportation firms, with data from published reports, or with information in our Division's files.

Volume of Receipts

Food dealers, slaughterers, chainstore warehouses, and State officials supplied the estimated volumes of the products handled. These volumes were compared with information published by the State of Hawaii, the University of Hawaii, and USDA's Market News Service. The volumes of commodities that would be handled in the proposed development are those of firms expected to relocate there.

Flow Patterns

After the volume of each commodity was determined, a flow pattern was developed from sales information obtained from the dealers of (1) sources of supply, (2) method of receipts at wholesaler's facility, (3) transfer of products between wholesalers, and (4) type of customer and destination of the product.

Distribution to the various parts of the Island of Oahu was estimated by using population statistics of each area as a percentage of the island's total population.

Marketing Costs

Marketing costs were for the volumes handled by independent food wholesalers during 1964. Table 20 shows estimated cost per ton and total costs for the volume handled by all independent wholesalers in Honolulu.

Detailed marketing cost estimates, by commodity group, for those firms expected to relocate at Fort Armstrong are shown in table 21. The basis for these costs is outlined in the following pages. Rental costs are based on private financing.

Movement to Wholesalers' Facilities.--A fee of $10 is charged for handling a container in the pier 2 container yard. The Public Utilities Commission sets a fee of approximately $19.20 per container for any movement over streets in Honolulu. Average tons per container were used to determine the cost per ton for this fee. We assumed that the $10 fee for the container yard movement would remain in

TABLE 20.--Estimated annual cost of moving food products through present facilities of 130 independent wholesalers, Honolulu, 1964

Cost item	Fresh fruits and vegetables			Meat and related products			Groceries			Dairy products and eggs			Totals		
	Volume	Average cost per ton	Total cost	Volume	Average cost per ton	Total cost	Volume	Average cost per ton	Total cost	Volume	Average cost per ton	Total cost	Volume	Average cost per ton	Total cost
MOVEMENT TO WHOLESALERS' FACILITIES	Tons	Dollars	Dollars	Tons	Dollars	Dollars	Tons	Dollars	Dollars	Tons	Dollars	Dollars	Tons	Dollars	Dollars
Container fees[1]	32,217	2.38	76,676	17,211	2.38	40,962	75,846	1.79	135,764	104	2.38	248	125,378	2.02	253,650
Cartage from dock and airport	20,640	5.74	118,474	12,413	9.06	112,462	18,224	3.71	67,611	1,714	10.61	18,186	52,991	5.98	316,733
Total	52,857	3.69	195,150	29,624	5.18	153,424	94,070	2.17	203,375	1,818	10.14	18,434	178,369	3.20	570,383
Avoidable delay to inbound trucks	51,470	.58	29,853	21,533	.76	16,365	21,539	.43	9,262	1,283	1.17	1,501	95,825	.59	56,981
Total movement to wholesalers' facilities[2]	66,810	3.37	225,003	49,472	3.43	169,789	102,367	2.08	212,637	2,713	7.35	19,935	221,362	2.83	627,364
HANDLING WITHIN THE MARKET AREA															
Labor:															
Loading buyers' trucks at the dock and airport	1,473	2.47	3,638	2,797	4.91	13,733	4,862	1.81	8,800	--	--	--	9,132	2.87	26,171
Unloading trucks and containers at wholesalers' facilities	66,810	1.44	96,206	49,472	2.15	106,635	102,367	1.51	154,574	2,713	2.55	6,918	221,362	1.64	364,333
Interdealer transfers	(4,191)	7.76	32,522	(758)	11.97	9,073	(3,718)	5.65	21,007	--	--	--	(8,667)	7.22	62,602
Handling within the wholesalers' facilities	(71,001)	2.95	209,453	(50,230)	23.63	1,186,935	(106,085)	6.75	716,074	(2,713)	11.37	30,847	(230,029)	9.32	2,143,309
Loading outbound trucks	66,810	2.47	165,021	49,472	4.91	242,908	102,367	1.81	185,284	2,713	3.05	8,275	221,362	2.72	601,488
Total labor	68,283	7.42	506,840	52,269	29.83	1,559,284	107,229	10.13	1,085,739	2,713	16.97	46,040	230,494	13.87	3,197,903
Other costs:															
Use of handling equipment	(71,001)	1.38	97,981	(50,230)	.64	32,147	(106,085)	.76	80,625	(2,713)	.17	461	(230,029)	.92	211,214
Rent for wholesale facilities	(71,001)	2.94	208,622	(50,230)	4.99	250,634	(106,085)	3.17	336,126	(2,713)	8.81	23,910	(230,029)	3.56	819,292
Off-premise storage[3]	(5,883)	3.21	18,875	(3,727)	5.24	19,537	(2,295)	4.93	11,323	(37)	13.08	484	(11,942)	4.21	50,219
Avoidable spoilage[3]	66,810	3.28	219,137	49,472	4.92	243,403	102,367	2.25	230,326	2,713	1.02	2,767	221,362	3.14	695,633
Total other costs[3]	66,810	4.60	306,603	49,472	5.72	282,781	102,367	4.07	416,751	2,713	8.98	24,371	221,362	4.66	1,030,506
Total labor and other costs within market areas[3]	68,283	11.91	813,443	52,269	35.24	1,842,065	107,229	14.01	1,502,490	2,713	25.95	70,411	230,494	18.34	4,228,409
DISTRIBUTING COMMODITIES															
Honolulu city	56,417	5.29	298,446	36,568	7.06	258,170	72,605	3.84	278,803	2,101	11.28	23,699	167,691	5.12	859,118
Other Oahu	9,379	8.19	76,814	9,474	10.42	98,719	25,115	6.25	156,969	612	13.74	8,409	44,580	7.65	340,911
Total, distributing commodities[4]	65,796	5.70	375,260	46,042	7.75	356,889	97,720	4.46	435,772	2,713	11.84	32,108	212,271	5.65	1,200,029
Grand total[3]	68,283	20.70	1,413,706	52,269	45.31	2,368,743	107,229	20.06	2,150,899	2,713	45.14	122,454	230,494	26.27	6,055,802

[1] Includes applicable cartage.
[2] The remainder of direct receipts, 9,132 tons, was loaded directly into buyers' trucks at the docks; the cost for this handling is included in labor costs for handling within the market.
[3] Off-premise storage and avoidable storage are not included in totals because complete cost estimates for refrigeration are not given.
[4] Excludes merchandise picked up by the customer at the wholesale facility.

TABLE 21.--Estimated annual costs of moving food products through present and proposed facilities by 71 independent wholesalers expected to relocate, Honolulu, 1964

Cost item[1]	Fresh fruits and vegetables					Meat and related products					Groceries				
	Volume in proposed market[2]	Cost in present market	Cost in proposed market		Savings	Volume in proposed market[2]	Cost in present market	Cost in proposed market		Savings	Volume in proposed market[2]	Cost in present market	Cost in proposed market		Savings
			Average per ton	Total				Average per ton	Total				Average per ton	Total	
MOVEMENT TO WHOLESALERS' FACILITIES	Tons	Dollars	Dollars	Dollars	Dollars	Tons	Dollars	Dollars	Dollars	Dollars	Tons	Dollars	Dollars	Dollars	Dollars
Container fees[3]	23,693	50,896	0.82	19,340	31,556	10,315	16,165	0.82	8,425	7,740	22,460	32,442	0.61	13,780	18,662
Cartage from dock and airport	16,086	105,582	5.74	92,334	13,248	4,961	76,865	9.06	44,947	31,918	5,521	36,569	3.71	20,482	16,087
Total	39,779	156,478	2.80	111,674	44,804	15,276	93,030	3.49	53,372	39,658	27,981	69,011	1.22	34,262	34,749
Avoidable delay to inbound trucks	0	21,550	0	0	21,550	0	12,747	0	0	12,747	0	2,877	0	0	2,877
Total movement to wholesalers' facilities	52,495	178,028	2.13	111,674	66,354	25,277	105,777	2.11	53,372	52,405	30,362	71,888	1.13	34,262	37,626
HANDLING WITHIN THE MARKET AREA															
Labor:															
Loading buyers' trucks at the docks and airport	1,473	3,638	1.08	1,591	2,047	2,282	11,205	2.60	5,933	5,272	820	1,484	.56	459	1,025
Unloading trucks and containers at wholesalers' facilities and off-premise storage	52,495	75,593	.52	27,297	48,296	25,277	54,346	1.75	44,235	10,111	30,362	45,847	.84	25,504	20,343
Interdealer transfers	(4,191)	32,522	3.50	14,669	17,853	0	0	0	0	0	(882)	4,983	3.23	2,849	2,134
Handling within the wholesalers' facilities	(56,686)	167,224	2.06	116,773	50,451	(25,277)	597,296	11.00	278,047	319,249	(31,244)	210,897	3.91	122,164	88,733
Loading outbound trucks	52,495	129,663	1.08	56,695	72,967	25,277	124,110	2.60	65,720	58,390	30,362	54,955	.56	17,003	37,952
Total labor	53,968	408,640	4.02	217,025	191,615	27,559	786,957	14.29	393,935	393,022	31,182	318,166	5.39	167,979	150,187
Other costs:															
Use of handling equipment	(56,686)	78,227	1.38	78,227	--	(25,277)	16,177	.64	16,177	--	(31,244)	23,745	.76	23,745	--
Rent for wholesale facilities	(56,686)	181,622	5.88	333,368	-151,746	(25,277)	147,540	3.59	90,785	56,755	(31,244)	124,660	10.79	337,226	-212,566
Off-premise storage[4]	0	11,899	0	0	11,899	0	13,231	0	0	13,231	0	427	0	0	427
Avoidable spoilage[4]	52,495	172,184	1.61	84,517	87,667	25,277	124,363	2.52	63,698	60,665	30,362	68,315	1.13	34,309	34,006
Total other costs[4]	52,495	259,849	7.84	411,595	-151,746	25,277	163,717	4.23	106,962	56,755	30,362	148,405	11.89	360,971	-212,566
Total labor and other costs within market areas[4]	53,968	668,489	11.65	628,620	39,869	27,559	950,674	18.18	500,897	449,777	31,182	466,571	16.96	528,950	-62,379
DISTRIBUTING COMMODITIES															
Honolulu city and other areas	45,300	239,637	5.29	239,637	--	17,502	123,564	7.06	123,564	--	22,873	87,832	3.84	87,832	--
Other Oahu	6,235	51,065	8.19	51,065	--	6,120	63,770	10.42	63,770	--	6,560	41,000	6.25	41,000	---
Total for distributing commodities	51,535	290,702	5.64	290,702	--	23,622	187,334	7.93	187,334	--	29,433	128,832	4.38	128,832	--
Grand total[4]	53,968	1,137,219	19.10	1,030,996	106,223	27,559	1,243,785	26.91	741,603	502,182	31,182	667,291	22.19	692,044	-24,753

See footnotes at end of table.

TABLE 21.--Estimated annual costs of moving food products through present and proposed facilities by 71 independent wholesalers expected to relocate, Honolulu, 1964--Continued

Cost item[1]	Dairy products and eggs					Totals				
	Volume in proposed market[2]	Cost in present market	Cost in proposed market		Savings	Volume in proposed market[2]	Cost in present market	Cost in proposed market		Savings
			Average per ton	Total				Average per ton	Total	
MOVEMENT TO WHOLESALERS' FACILITIES	Tons	Dollars	Dollars	Dollars	Dollars	Tons	Dollars	Dollars	Dollars	Dollars
Container fees[3]	508	248	0.82	415	-167	56,976	99,751	0.74	41,960	57,791
Cartage from dock and airport	40	4,711	10.63	425	4,286	26,608	223,727	5.95	158,188	65,539
Total	548	4,959	1.53	840	4,119	83,584	323,478	2.39	200,148	123,330
Avoidable delay to inbound trucks	0	0	0	0	--	0	37,174	0	0	37,174
Total movement to wholesalers' facilities	1,430	4,959	.59	840	4,119	109,564	360,652	1.83	200,148	160,504
HANDLING WITHIN THE MARKET AREA										
Labor:										
Loading buyers' trucks at the docks and airport	0	0	0	0	--	4,575	16,327	1.74	7,983	8,344
Unloading trucks and containers at wholesalers' facilities and off-premise storage	1,430	3,647	.96	1,373	2,274	109,564	179,433	.90	98,409	81,024
Interdealer transfers	0	0	0	0	--	(5,073)	37,505	3.45	17,518	19,987
Handling within the wholesalers' facilities	(1,430)	16,259	4.33	6,192	10,067	(114,637)	991,676	4.56	523,176	468,500
Loading outbound trucks	1,430	4,362	.91	1,301	3,061	109,564	313,090	1.28	140,719	172,371
Total labor	1,430	24,268	6.20	8,866	15,402	114,139	1,538,031	6.90	787,805	750,226
Other costs:										
Use of handling equipment	(1,430)	243	.17	243	--	(114,637)	118,392	1.03	118,392	--
Rent for wholesale facilities	(1,430)	17,910	21.02	30,061	-12,151	(114,637)	471,732	6.90	791,440	-319,708
Off-premise storage[4]	0	484	0	0	484	0	26,041	0	0	26,041
Avoidable spoilage[4]	1,430	1,459	.56	801	658	109,564	366,321	1.67	183,325	182,996
Total other costs[4]	1,430	18,153	21.19	30,304	-12,151	109,564	590,124	8.30	909,832	-319,708
Total labor and other costs within market areas[4]	1,430	42,421	27.39	39,170	3,251	114,139	2,128,155	14.87	1,697,637	430,518
DISTRIBUTING COMMODITIES										
Honolulu city and other areas	1,107	12,487	11.28	12,487	--	86,782	463,520	5.34	463,520	--
Other Oahu	323	4,438	13.74	4,438	--	19,238	160,273	8.33	160,273	--
Total for distributing commodities	1,430	16,925	11.84	16,925	--	106,020	623,793	5.88	623,793	--
Grand total[4]	1,430	64,305	39.82	56,935	7,370	114,139	3,112,600	22.09	2,521,578	591,022

[1] The coat aample is based on tabla 20 because a representative proportion of tha firms in the aample are conaidered as probable tenants on a new market.
[2] Volumea in parentheses are duplicated in other items.
[3] Includea applicable cartaga.
[4] Off-premiaa atorage and avoidable spoilage are not included in total costs because complete cost estimatas for refrigeration ara not given.

effect for delivery to the proposed food center.

Truck cost per ton for cartage from docks and airport is the same as that estimated for delivery within the city of Honolulu, plus loading cost per ton, less avoidable delay and unloading cost per ton. The tonnage of products moved directly to the wholesale facility from the docks or airport would remain unchanged for those firms moving to the new market. However, such movement from the port would not be subject to the over-the-road container fee because it would move directly to the wholesale facility. It is assumed that much of the tonnage now moving from the present break-bulk station would go directly to the proposed facilities and the breaking function would be performed there.

Avoidable delay to inbound trucks was based on observations and evaluation of the traffic flow during market activity. At some of the marketplaces traffic has been congested during certain hours for many years. In the proposed development there should be no avoidable delay, because of the wide streets and access on Ala Moana Boulevard.

Handling Within the Market Area.--Selected labor costs for each food group were estimated by multiplying the number of employees in the group by a standard number of man-hours per year, and then multiplying the result by the labor cost per man-hour. Labor cost per hour was obtained from firms' records, local averages, and general industry sources. Total labor cost was divided by total tons of direct receipts plus interdealer movement, less tons picked up by customers at the docks and airport, to get an average cost per ton. Labor cost per ton for various operations was estimated by taking the average labor requirement for each operation derived from a representative sample of firms.

The total cost to each food group for use of handling equipment was estimated by dividing the yearly cost for the equipment by the same tonnage used in estimating total labor cost. Industrial engineers in the Transportation and Facilities Research Division estimated the yearly cost of handling equipment.

Labor and equipment costs in the proposed development were based on costs in other cities with modern facilities and advanced handling methods. Costs were adjusted where necessary to reflect conditions and requirements of the Honolulu food industry.

Rental costs for wholesalers' facilities and off-premise storage were obtained from wholesalers. The average cost per ton for rental of wholesalers' facilities was obtained by dividing the total rental cost by the total direct receipts, plus interdealer movement, less tons picked up at the docks and airport by customers. The cost per ton for off-premise storage was obtained by dividing the total cost for this storage by the total tons involved.

Spoilage was estimated from publications of the University of Hawaii, discussions with dealers, and previous work conducted by our Division in other cities. Spoilage costs in the proposed facilities were estimated to be approximately the same as those in modern facilities on the mainland.

One of the more efficient methods of unloading trucks is to load the packages on pallets in the truck and move the pallets directly to a holding area for later movement to storage. For the greatest economy in labor with this practice, the unloading of the truck and the movement to storage must be separate operations. Separating these operations is difficult at ground-level facilities because the forklift truck used to transport the load to storage is needed to move the loaded pallet from the truck. The forklift often must wait for pallets to be loaded.

Distributing Commodities.--The total truck cost for each food group was estimated by multiplying the number of delivery trucks used by an average cost for trucks of the size used by each group. Truck cost included general operating and maintenance expenses, insurance and licenses, and drivers' wages. Total truck cost was divided by the estimated tons hauled by wholesalers' trucks to find the average cost per ton. Cartage cost per ton by cartage firms was assumed to be the same as that for the wholesalers' trucks.

Total truck cost for each area was obtained by multiplying the tons delivered there by an estimated cost per unit of time required for delivery. Truck cost per ton within the city of Honolulu and to other parts of Oahu was obtained by dividing the total truck cost, including cartage, for each area by the tons delivered there.

Distribution costs were assumed to be the same in the proposed development as in the present facilities.

Operating Characteristics of Buildings With and Without Platforms

Most of the wholesale food facilities constructed since the end of World War II have platforms approximately the same

height as most truckbeds (about 45 inches above pavement level). In Honolulu, however, most food wholesalers and many other businesses operate in warehouses without platforms.

Research was conducted to ascertain the relative merits of multiple-occupancy buildings with and without platforms. Certain labor requirements for receiving and loading out products, selected equipment used in receiving and loading out, and the cost of the building with and without platforms were determined. Also examined was the effect platforms have on general operating conditions in a wholesale food distribution center.

Most of the data were collected in one food center, which had facilities with and without platforms. A wide range of handling methods was used at this center. Care was taken in selecting the study firms to insure that business practices and volumes were comparable.

The firms handled fruits and vegetables. But many of the comparisons would apply to wholesale buildings for other food commodities.

Labor Requirements

One of the major costs of operating a wholesale food distribution firm is the cost of warehouse labor. Availability of truckbed-height docks would affect labor costs of receiving and loading out operations, but not of handling within the warehouse.

Data on labor requirements were collected by time study, from standard texts, and from food industry sources. In the time studies the activity of each member of a work crew engaging in each operation was studied. The time required to perform each part of the operation was recorded as well as the productive time and total elapsed time. The time data were adjusted, if necessary, to reflect normal effort of the crew. Delays during the operation were eliminated if avoidable, but were included if they were considered unavoidable. The result was a standard time for performing the operation. Sufficient timings were made to establish a statistically reliable average. Unless otherwise noted, elapsed readings were weighted by the tonnages handled to show standard labor requirements in man-hours per ton.

Labor requirements for receiving and loading out were based on handling one ton of produce in 40-pound packages. Changes in product and local conditions and methods may affect labor requirements. The man-hour requirements developed in this section for various operations are not intended to be general standards but to illustrate the effect of the presence or absence of platforms.

Receiving.--Receiving includes the removal of incoming merchandise from a vehicle and placing it in a temporary holding area before moving it into the facility. In order that the differences caused by the availability of docks could be examined more closely, the labor requirements for receiving include only the time required for unloading and a standard travel distance of 100 feet. The complete time required to move the incoming products to storage and to place them in storage is affected by the internal layout of the facility and is not included in this report.

Work practices used in receiving often depend on the size of the firm. Lack of platforms poses one major problem, however, regardless of the work practices used--moving the merchandise from the bed of the carrier to pavement level.

Small firms frequently use two-wheel handtrucks for receiving. This method of receiving is not as efficient as others in common use. In facilities at ground level, the packages can be moved from the truck to the ground on a skate-wheel conveyor and then stacked by hand on the handtruck. An alternate method of receiving with handtrucks is to use an adjustable platform. The platform lifts the worker, with an empty handtruck, to truckbed level and then lowers worker and loaded handtruck to the ground. Adjustable platforms are usually portable and electric. Electrical outlets must be available to provide power.

At facilities with platforms, workers can move directly into the incoming vehicles to load the handtrucks. Table 22 shows the labor required to receive 1 ton of produce by handtruck at facilities with and without platforms.

One of the more efficient methods of unloading trucks is to load the packages on pallets in the truck and move the pallets directly to a holding area for later movement to storage. For the greatest economy in labor with this practice, the unloading of the truck and the movement to storage must be separate operations. Separating these operations is difficult at ground-level facilities because the forklift truck used to transport the load to storage is needed to move the loaded pallet from the truck. The

TABLE 22.--Labor required in receiving produce by handtruck at wholesale facilities at ground level and with platforms at truck-bed height

[1 ton of produce in 40-pound packages]

Type of facility, handling method, and operation element	Workers	Labor required
AT GROUND LEVEL	Number	Man-hours
Skate-wheel conveyor:		
Set up and clean up	2	0.013
Unload by conveyor to ground	2	.103
Pick up load and move to facility	2	.021
Transport load 100 feet	1	.122
Personal and fatigue allowance[1]		.039
Total labor	2	.298
Adjustable platform:		
Set up and clean up	3	.050
Move handtruck to platform, raise platform to truckbed height	1	.035
Load handtruck	1	.043
Move handtruck to platform, lower platform to ground	1	.035
Move load to facility	1	.020
Transport load 100 feet	1	.122
Personal and fatigue allowance[1]		.046
Total labor	3	.351
WITH TRUCKBED-HEIGHT PLATFORMS		
Set up and clean up	3	.006
Load handtruck	1	.069
Enter carrier	2	.007
Exchange empty for loaded handtruck	2	.011
Leave carrier	2	.018
Transport load 100 feet	1	.122
Personal and fatigue allowance[1]		.035
Total labor	3	.268

[1] 15 percent of the total labor requirement applied to all members of a work crew.

TABLE 23.--Labor required in receiving produce by forklift truck at wholesale facilities at ground level and with platforms at truck-bed height[1]

[1 ton of produce in 40-pound packages]

Type of facility and operation element	Workers	Labor required
AT GROUND LEVEL	Number	Man-hours
Set up and clean up	2	0.004
Place empty pallet on dolly in truck	1	.019
Move dolly to stacking face	1	.014
Place produce on pallet	1	.091
Move loaded pallet on dolly to rear of truck	1	.008
Delay[2]	1	.044
Pick up loaded pallet	1	.013
Move loaded pallet near wholesale facility	1	.008
Transport pallet 100 feet	1	.019
Personal and fatigue allowance[3]		.033
Total labor	2	.253
WITH TRUCKBED-HEIGHT PLATFORMS		
Set up and clean up	2	.004
Position pallet for loading	1	.013
Load pallet	1	.091
Move pallet to platform	2	.008
Pick up load on platform	1	.004
Transport load 100 feet	1	.019
Personal and fatigue allowance[3]		.021
Total labor	2	.160

[1] The containers are loaded on pallets in the truck.
[2] Loader delay.
[3] 15 percent of the total labor requirement applied to all members of a work crew.

TABLE 24.--Labor required in receiving produce on pallets, using forklift truck, at wholesale facilities at ground level and with platforms at truckbed height

[1 ton of produce in 40-pound packages]

Type of facility and operation element	Workers	Labor required
AT GROUND LEVEL	Number	Man-hours
Set up and clean up	2	0.004
Move pallets to rear of truck	1	.055
Remove loaded pallets by forklift and place them near the truck	1	.021
Transport load 100 feet	1	.019
Personal and fatigue allowance[1]		.015
Total labor	2	.114
WITH TRUCKBED-HEIGHT PLATFORMS		
Set up and clean up	1	.003
Remove loaded pallets by forklift and place them near the wholesale facility	1	.021
Transport load 100 feet	1	.019
Personal and fatigue allowance[1]		.007
Total labor	1	.050

[1] 15 percent of the total labor requirement applied to all members of a work crew.

forklift often must wait for pallets to be loaded.

At facilities with platforms, the pallets are loaded on the truck and moved to the platform by a pallet transporter, and movement to storage by forklift can be a separate operation (table 23).

Shipping products, including fruits and vegetables, on pallets is increasing. Although it is beyond the scope of this report to discuss the merits of this type of shipping, some consideration should be given to the effects of platforms on receiving products on pallets. Table 24 shows the labor requirements for receiving loaded pallets at ground-level facilities and at facilities with truckbed-height platforms.

Absence of platforms seriously affects unloading operations when products are received on pallets. When platforms are available, forklift trucks usually move directly into the truck and remove loaded pallets. At ground-level facilities an additional employee must be stationed in the truck to move the loaded pallets to the rear so the forklift truck can reach them. As the employee in the truck and the forklift operator depend on each other, there is often costly delay. Labor requirements for unloading products received on pallets--usually one of the most efficient methods--are considerably increased by the lack of platforms.

Many of the factors that affect the labor requirements for receiving conventional trucks would also apply to receiving con-

tainerized shipments. When containers are placed on the ground at ground-level facilities, there would be little or no height difference between the bed of the container and the floor of the wholesale facility. Unloading would be similar to unloading conventional trucks at facilities with platforms. Receiving containers on truck chassis at ground-level facilities would present the same problems as receiving a conventional truck at these facilities.

In the proposed development, both conventional trucks and containers would be used; therefore, provision should be made for efficiency in unloading both types of vehicles.

Loading Out.--The method used for loading out trucks usually depends on the distance from truck to facility. At ground-level facilities, trucks parked near the building are usually loaded by use of portable, adjustable docks and two-wheel handtrucks. Two-wheel handtrucks are used because of the low capacity of many portable adjustable docks. These docks are used almost exclusively for loading out operations.

At wholesale facilities with platforms, trucks are often loaded by two- or four-wheel handtrucks. A truckbed-height wholesale facility can more easily use the greater capacity of the four-wheel handtruck. Any reasonable difference between the height of the dock and the height of the truck can be corrected with bridgeplates or similar equipment.

Table 25 shows the labor requirements for loading out fruits and vegetables from ground-level and truckbed-height facilities using two-wheel handtrucks.

TABLE 25.--Labor required in loading out produce, using 2-wheel handtrucks, at wholesale facilities at ground level and with platforms at truckbed height[1]

[1 ton of produce in 40-pound packages]

Type of facility and operation element	Workers	Labor required
AT GROUND LEVEL[2]	Number	Man-hours
Set up and clean up	5	0.010
Transport load and release in truck	5	.130
Operate portable adjustable dock	5	.070
Load truck	5	.160
Personal and fatigue allowance[3]		.056
Total labor	5	.426
WITH TRUCKBED-HEIGHT PLATFORMS		
Set up and clean up	5	.010
Transport load and release in truck	5	.130
Load truck	5	.160
Personal and fatigue allowance[3]		.045
Total labor	5	.345

[1] Excludes order assembly and movement within the wholesale facility.
[2] Using a portable, adjustable dock.
[3] 15 percent of the total labor requirement applied to all members of a work crew.

Using four-wheel handtrucks instead of two-wheel handtrucks would not greatly affect truck loading, but it would increase order assembly productivity considerably. Research indicates that, for some commodities, order assembly productivity can be as much as 37 percent higher with four-wheel handtrucks than with two-wheel handtrucks. Of course, the size of the warehouse and length of travel distances affect the possible savings with this type of equipment.

Buyers coming to the market often park their trucks away from the buildings and place orders with a number of firms. The firms assemble the merchandise and transport the products to the buyer's truck. One of the more common methods of transporting produce to a buyer parked away from the wholesale facility is to use a special, extra-large metal pallet and a forklift truck (fig. 15).

The basic methods of loading with a forklift truck and metal pallet are about the same whether the wholesale facility is at ground level or truckbed height. Merchandise is selected with a two- or four-wheel handtruck and loaded onto the metal pallet. A two-wheel handtruck is placed with the load and a forklift truck moves the pallet to the buyer's truck. The forklift raises the pallet to truckbed level, and a worker uses the handtruck to move the merchandise from the pallet to the truckbed. The handtruck is then replaced on the pallet, and the forklift returns the pallet and handtruck to the wholesale facility for another load.

Table 26 shows the labor requirements for this operation from ground-level and truckbed-height facilities. Travel times for the forklift truck are not included, as this part of the operation would depend on distance. The principal effect of platforms on loading with a forklift truck and an extra-large metal pallet is the additional time required to position a pallet on a dock compared with placing it directly on the ground.

Comparison of Ground-Level and Truckbed-Height Facilities.--Table 27 summarizes labor requirements for receiving and loading out fruits and vegetables at ground-level and truckbed-height wholesale facilities.

Receiving at truckbed-height facilities requires 45 to 75 percent of the labor required at ground-level facilities. Loading out by handtruck at a wholesale facility

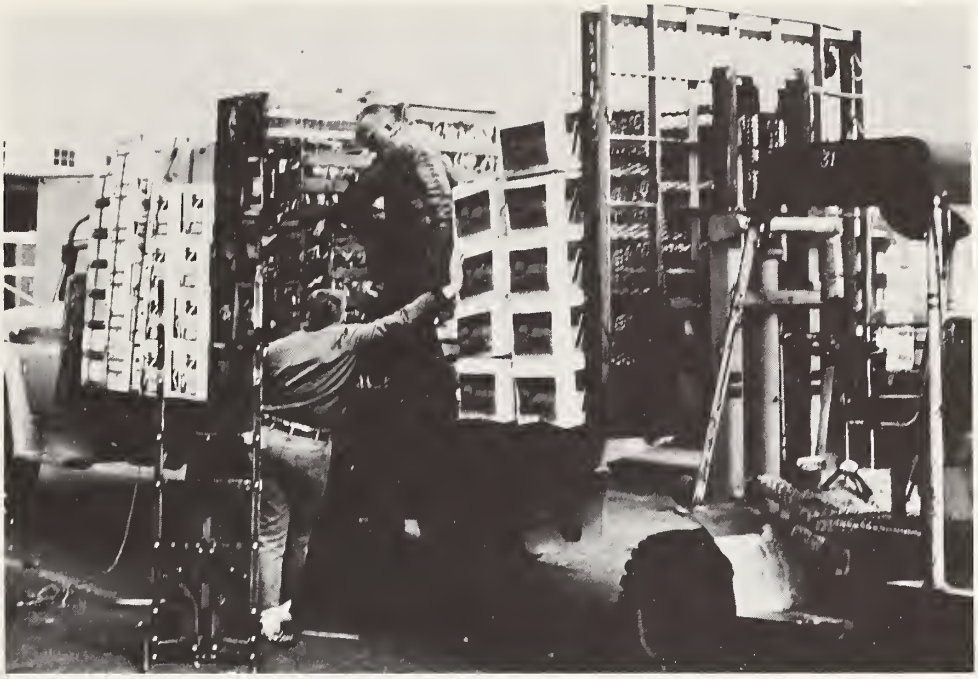

FIGURE 15.--Loading a truck at street level with a forklift truck and an extra-large metal pallet.

TABLE 26.--Labor required to load produce, using a forklift truck and extra-large metal pallet, on a truck parked away from wholesale facilities at ground level and with platforms at truckbed height[1]

[1 ton of produce in 40-pound packages]

Type of facility and operation element	Workers	Labor required
AT GROUND LEVEL	Number	Man-hours
Set up and clean up	1	0.007
Load metal pallet	1	.148
Position forklift and pallet at truck	1	.016
Unload merchandise into truck	1	.044
Lower pallet to street level	1	.004
Personal and fatigue allowance[2]		.033
Total labor	1	.252
WITH TRUCKBED-HEIGHT PLATFORMS		
Set up and clean up	1	.007
Load metal pallet	1	.148
Remove pallet from platform	1	.003
Position pallet at truck	1	.016
Unload merchandise into truck	1	.044
Lower pallet	1	.004
Position pallet at platform	1	.004
Personal and fatigue allowance[2]		.034
Total labor	1	.260

[1] Does not include travel time because this would depend on the distance.
[2] 15 percent of the total labor requirement applied to all members of a work crew.

TABLE 27.--Labor required for receiving and loading out produce in trucks, at wholesale fruit and vegetable facilities at ground-level and with truckbed-height platforms

[1 ton of produce in 40-pound packages]

Operation and handling method	At ground level	With truckbed-height platforms
RECEIVING[1]	Man-hours	Man-hours
Handtrucks	--	0.268
Handtruck and--		
Skate-wheel conveyor	0.298	--
Adjustable platform	.351	--
Forklift trucks and pallets loaded in the truck	.253	.160
Forklift trucks and produce received on pallets	.114	.050
LOADING OUT[2]		
Handtrucks	--	.345
Handtrucks and portable platform near the facility	.426	--
Forklift trucks and pallets, trucks parked away from the facility	.252	.260

[1] Includes 100 feet of travel; does not include storage labor requirements.
[2] Excludes selection and travel times.

with a platform at truckbed-height requires 81 percent of the labor required at a ground-level facility. Loading out by forklift truck to a truck parked away from the wholesale facility is approximately the same at facilities with and without platforms.

Equipment Requirements

The only differences in equipment required for ground-level and truckbed-height

wholesale facilities would be the special equipment for access to trucks during receiving and loading out operations. The principal piece of special equipment required in ground-level facilities would be the adjustable platforms used frequently for loading delivery trucks and occasionally for receiving merchandise. Ground-level facilities may also use forklift trucks to lower pallets from incoming trucks. Truckbed-height facilities would require a few bridgeplates to correct minor differences in truckbed and platform heights and to bridge the gap between trucks and platforms.

Facility Cost and General Considerations

Building a standard unit at ground level would cost an estimated $1,000 a unit less than building a unit with platforms at truckbed height. Expressed on an annual basis for the life of the building, this saving is insignificant.

The design of facilities on a wholesale food distribution center affects not only individual firms, but also the market as a whole.

Research shows a considerable contrast between traffic and sanitation conditions at ground-level and truckbed-height facilities. During peak periods of activity, firms housed in ground-level facilities used almost all of the street for temporary storage and display of incoming merchandise (fig 16). Lack of a platform, acting as a boundary, made control of this congestion very difficult. Placing large amounts of produce in the street also caused large accumulations of trash by the end of the day.

On the other hand, receiving and display space at wholesale facilities with platforms was limited to the space directly in front of the unit (fig. 17). Traffic moved easily through markets of this type during all periods of the day. Little trash accumulated in streets and what trash was present was adjacent to the wholesale facilities where it could be collected by company employees.

Docking Arrangements for Loading and Unloading

Figure 18 shows four arrangements for loading and unloading at the rear of the facility: (1) Standard rear platform plus removable dock or truck frame of the same height as the platform and placed at right angles to it; (2) extra-wide platform with slots cut for the wheels of the straddle trucks; (3) 6-inch-high platform of standard width, with the container placed on the ground; and (4) no platform, and the container placed on the ground. Each of these arrangements would allow direct access of modern handling equipment to the interior of the container.

FIGURE 16.--Receiving area at ground level.

FIGURE 17.--Receiving area at truckbed height.

Two guidelines should be used in examining these arrangements: Cost of construction and flexibility of use of the rear of the wholesale facility.

Table 28 shows cost differences per fruit and vegetable unit for the four rear dock designs. The difference in cost would not change the annual cost of the facility to any great degree.

Although a unit with a 6-inch-high platform or no platform would be suitable for receiving containers on straddle trucks, receiving from conventional trucks, or from containers on trailer chassis would be difficult.

The standard platform and removable dock and the extra-wide dock with slots would accommodate containers on either straddle trucks or trailer chassis and also conventional trucks. But the initial cost of removable docks would be considerably less than the cost of the extra-wide platforms with slots, and the wide platforms would require additional land. The narrower platform would reduce travel distances during receiving operations and eliminate the problem of maintaining the slots in the platform.

TABLE 28.--Construction costs of standard units with 4 different arrangements of the receiving area for the proposed wholesale food distribution center, Honolulu[1]

Arrangement of receiving area	Initial cost	Cost difference per year[2]
	Dollars	Dollars
Standard unit designs with --		
Standard platform plus removable dock...	26,333	+65
Extra-wide dock with slots for straddle truck.....	27,650	+168
6-inch-high platform.....	25,000	-39
No platform.....	24,500	-78

[1] Cost relationships calculated by A. B. Lowstuter, USDA. See the proposed fruit and vegetable building costs for the basic unit cost used in this table.

[2] A minus sign designates a reduction, and a plus sign designates an increase in the yearly cost of units with 4 different arrangements of the receiving area from a standard unit with a conventional rear platform ($25,500). Yearly costs are calculated at 6 percent interest and 25 years' depreciation.

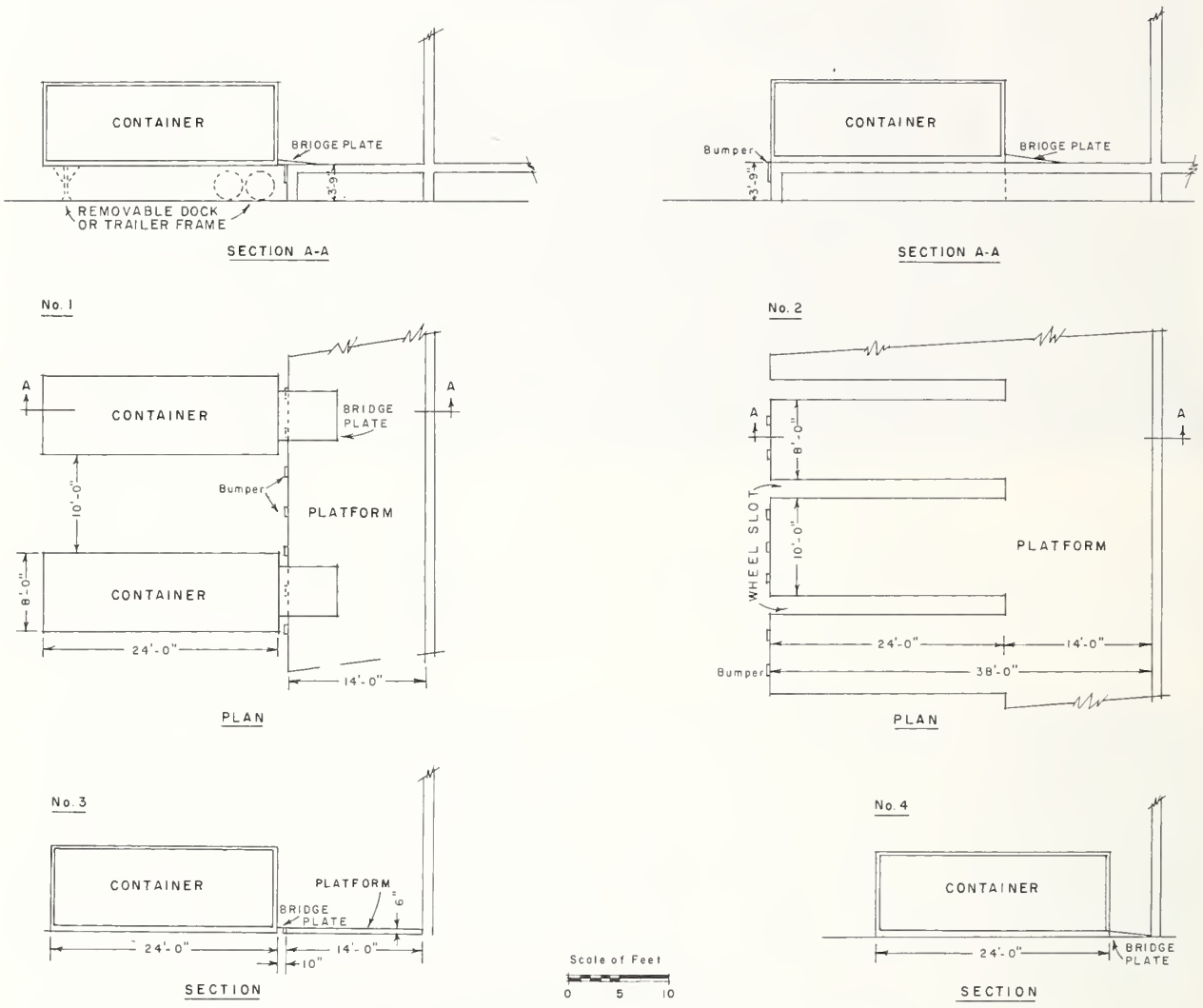

FIGURE 18.--Four arrangements of the receiving area to accommodate containers and trucks.